Vol. XXVII. Part 9.

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The Journal of the Department of Agriculture of Victoria, Australia.

Sept., 1929.

PRINCIPAL CONTENTS

Standard Herd Test—Report for Year 1928-29

Control of the Codling Moth

Winter Egg-Laying Competition

The Sheep Blowfly

Summer Fodder Crops

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THE JOURNAL

OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

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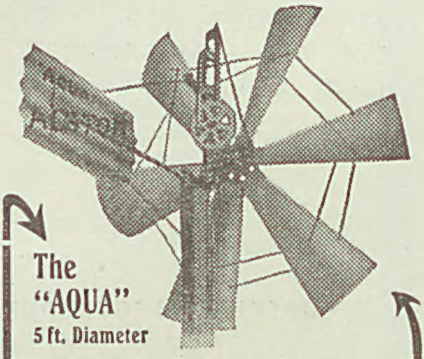

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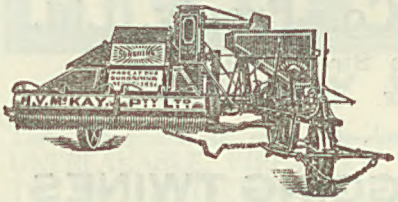

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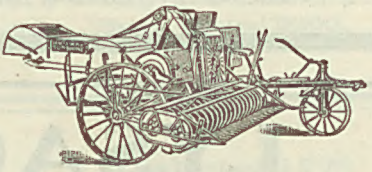

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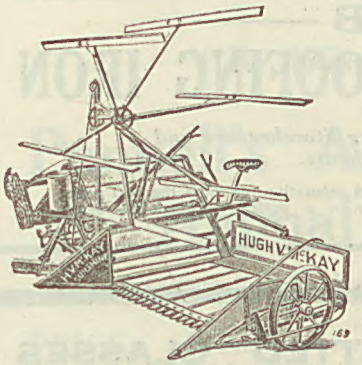

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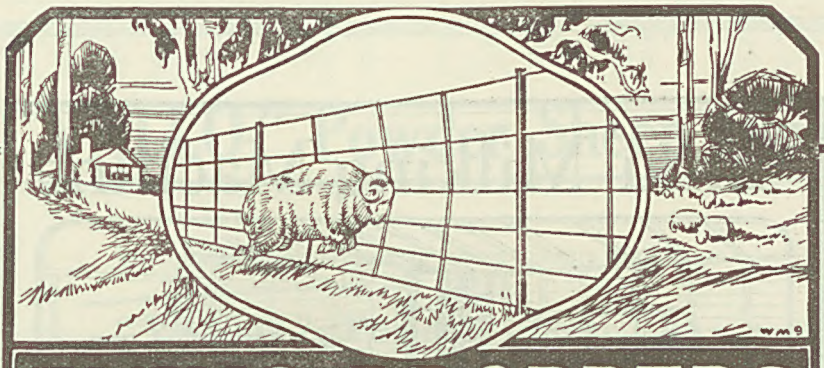

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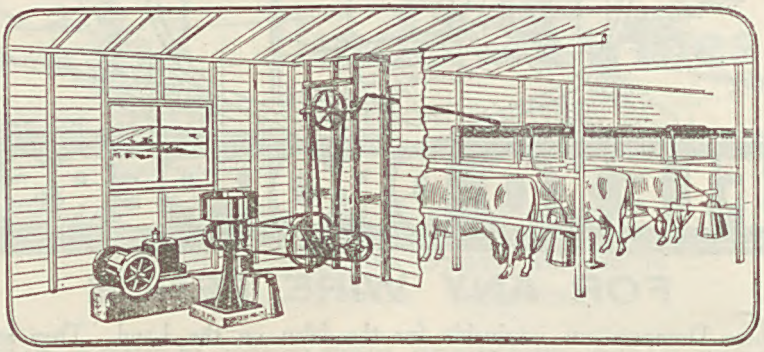

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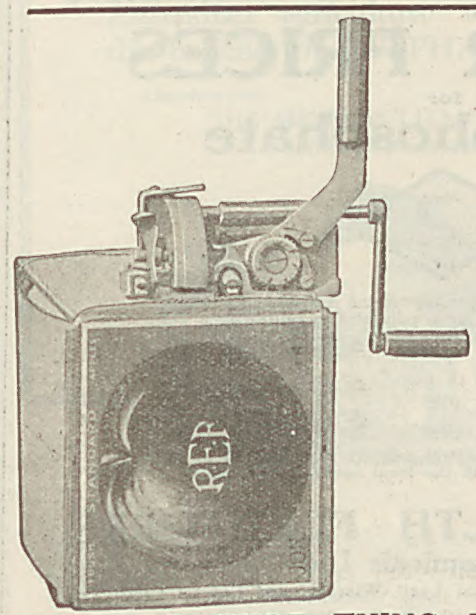

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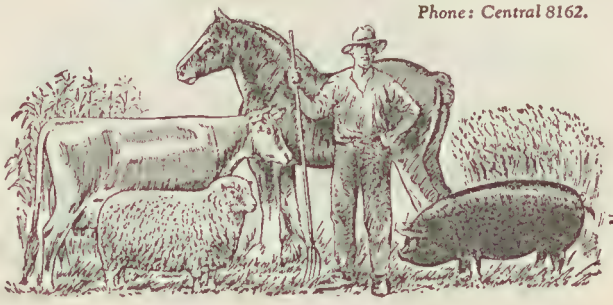

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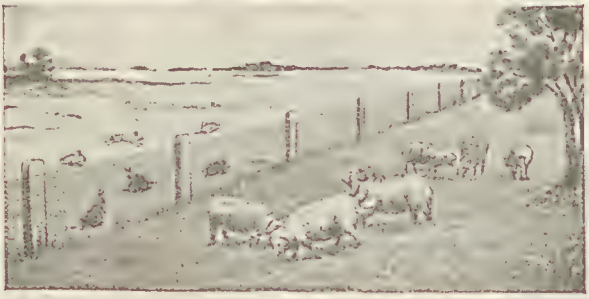

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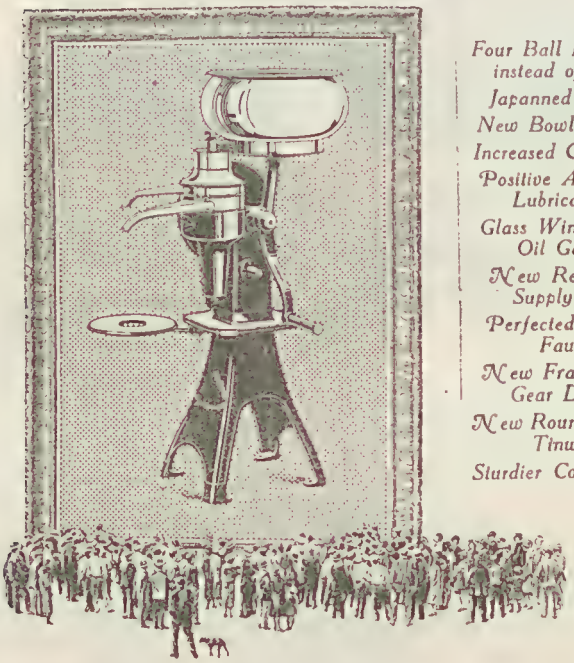

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THE JOURNAL

OF THE

Department of Agriculture

OF

VICTORIA.

Vol. XXVII. September, 1929. Part 9

STANDARD HERD RECORDS.

REPORT FOR 1928-29.

By A. J. Gill, Senior Herd Tester.

THE BUILDING UP OF DAIRY HERDS.

The introduction and the continuance of the Government Standard Herd Test have been of vital importance to the dairying industry. It has enabled the breeder to ascertain which members of his herd are the best producers, and by mating these animals with the sons of proved cows, the milk yielding character has been intensified in their progeny. The herd test has not only shown the great possibilities of careful selection and mating, but has assisted the farmer to obtain the sires necessary for the formation of a lucrative herd. Indeed, one might go further and say that the Standard Herd Records have been the salvation of the dairying industry.

The building up, maintaining, and improving of profitable herds is a matter that calls for a considerable amount of careful study. The watching of the results of mating certain strains of blood makes the work intensely interesting, not only to the beginner, but to the experienced farmer.

There are two methods by which a dairy herd can be started—a farmer may breed his own stock, or he may purchase them in the open market. Though the latter method is adopted by a number of farmers it cannot be recommended. In the first place, the cows disposed of in the saleyard are usually those that the owner has some very good reason for wishing to be rid of, and in the second place, sooner or later it means the purchasing of disease-infected animals.

Guarding Against Introduction of Disease.

We have of late years heard a great deal about the marking of the cull cow, that is, the cow sold on account of low production. Purchasers have suggested that such branding should be compulsory, so that one might know exactly what he was purchasing.

If the low producer were the only type of culled cow coming on to the market, the farmer could buy with a comparatively easy mind. At the worst his purchase would only result in the loss of a few shillings. The cull cow may, however, be a high producer, but capable of spreading such diseases as contagious abortion, mammitis, &c. Such animals are to be avoided as though infected with plague. In 99 per cent. of cases, if not in all cases, outbreaks of disease amongst dairy cows are caused by the introduction into herds of cows purchased in

Fairy of Willow Park. (Highest producing Mature Cow.)
(Born 28.9.21.)
Owner—Mr. W. K. Atkinson.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1923–24	9,498	4·00	380·12
1924–25	13,225	3·99	527·52
1925–26	13,892	4·11	570·46
1927–28	15,084	4·28	645·81
1928–29	19,199	3·81	731·97

the saleyard. Mammitis has been known to reduce the output of a herd by 50 per cent. in a few weeks, and if once contagious abortion occurs in a herd, it may cost hundreds of pounds to eradicate it.

Unfortunately, the carriers of disease cannot be detected by the eye, and if farmers would breed their own stock, an important step towards the stamping out of disease would have been taken. Farmers would do well if, when they are compelled to purchase stock, to demand a clean certificate. If this cannot be given, then the purchased animals should be isolated until carefully examined by a veterinary surgeon.

The necessity for guarding against the introduction of disease cannot be too strongly stressed. I could quote numbers of cases where heavy losses have occurred, and are still occurring, and farmers have been brought to the verge of financial ruin through disease introduced from purchased stock. It must always be remembered that an unhealthy herd can never be a profitable one. To those unfortunate enough to own herds in which disease has broken out, I would say: Have all the cows tested carefully by a veterinary surgeon; separate those that are diseased from those that are not affected, and send the unhealthy animals to the butcher. Then a start may be made at building up a herd free from disease. My suggestion may seem drastic, but I feel convinced that this is the way that will prove the most economical in the end, even though some good animals may have to be sacrificed.

Halecote Oakleaf Fobes.
(Born 1.7.20.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1922–23	8,415	3·55	298·52
1923–24	13,690	4·43	465·81
1924–25	20,199	3·18	642·10
1925–26	19,260	3·60	693·07
1926–27	15,512	3·77	584·56
1928	19,026	3·56	676·77

Some of these infectious stock diseases will continue to be a source of serious loss until dairy farmers can make up their minds to face the matter boldly and decisively. A healthy herd should be every breeder's objective.

Improvement of the Herd.

Improvement of stock may be discussed under two headings:—First, the improvement of pure-bred animals; and, secondly, the improvement of our general dairy herds which consist of mongrels and grades, but chiefly mongrel.

In the raising of the standard of dairy stock the most important factor is the good pure-bred sire, Therefore, the first step necessary is the improvement of our pure-bred stock. If we had only good pure-bred stock in the country, then it would soon follow that there would be all good grades.

The improvement of our general dairy herds, which can only come through the good sire, would be rapid, if every pure-bred bull were a good one.

Consequently we are, first of all, concerned chiefly with the improvement of our pure-bred pedigreed stock, and the success of the dairying industry is primarily in the hands of the breeders of pure stock.

Mr. J. Plattfuss's Tarrawarra 56.
(Born —.5.19.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1925–26	19,285	3·05	588·36
1926–27	21,582	2·97	641·57
1928–29	22,645	2·78	629·76

Since the introduction of the Test we have seen the gradual intensifying of the faculty for milk production, the concentrating on certain strains of blood and the discarding of some families. Breeders are working along certain lines. Theories are being tried out, and as times goes on we can expect fewer disappointments, because the lines along which to breed will become more defined. The number of herds reaching the 500-lb. average per cow and the high averages of our young stock is exceedingly gratifying. Those breeders who are having their cows tested are to be congratulated on their success, and I think we can say, without boasting, that the quality of stock they are producing stands second to none in any part of the world.

The Essential Points in Dairy Cows.

In the breeding and improvement of stock the four main factors which have to be studied are health, production, conformation to type, and pedigree.

If the breeder had to pay attention to one feature only, breeding would become a very simple matter. This is not so; a combination of features have to be studied. The breeder must be ever on the alert watching the result of each mating.

Testing, if correctly carried out, enables him to arrive at the producing capabilities of the cow. It is necessary that the animal should be tested for a certain number of years in succession, in order that consistency may be assured. This is a vital point. We must have stock with the ability to produce profitably over a number of years.

Springfield No. 9.
Owner—Mr. O. Syme, Macedon.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1921–22	9,824	3·63	356·82
1922–23	12,331	3·95	487·11
1924	14,227	4·04	574·74
1925–26	15,652	3·82	598·33
1927–28	17,435	3·47	605·06

I have known cows of a certain family that after milking for two or three years developed into beef animals and become comparatively useless for dairying purposes. The testing of a cow once and again in a few years, while it may be better than no testing whatever, leaves much to be desired. A cow may be kept empty during her testing period and have been dry for twelve months before; consequently too much reliance could not be placed on tests of this description. The testing for twelve months is a practice which encourages the keeping of a cow empty. It is a test that should be discouraged, having no actual value, and being rather misleading than otherwise, when compared with nine months' yield. All cows to be fully profitable should calve every twelve months.

In the testing of grade herds, continuous testing is necessary so that an animal may be discarded when she becomes unprofitable. When mating stock the breeder must take quantities of milk into consideration, also the percentage of butter-fat, so as to rectify deficiencies that may appear. He must also study carefully the type or conformation of his cows and mate with a view to correcting blemishes which in a few years may become serious deformities. If a cow is to produce heavily and transmit her qualities she must be of the correct form and build.

Certain regulations as to type and colour are laid down by each Breeding Association. These regulations are essential to keep the blood pure. Our only hope for continued improvement is through pure blood. Each Breeding Society holds before its breeders the ideal

Victoria Freemartin.
Owned by Department of Agriculture, Victoria.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1924–25	10,589	3·69	391·08
1926–27	11,329	3·53	399·61
1927–28	17,478	3·38	590·32
1928–29	19,362	3·38	653·60

animals to breed for, but to my mind the requirements will not be complete until some provision is made that unless an animal attain a certain standard of production under Government Herd Test regulations her name must be removed from the herd book.

The successful breeder is the man who not only tests his cows and weeds out all low-producing animals, but he who, while paying attention to the health of his stock, also builds up a herd of animals of correct conformation free from blemishes.

We have breeders who have tried to follow a single feature. Some of our old conservative breeders endeavour to select on appearance only. They have made some dismal failures, and a progressive farmer of to-day will not buy pure-bred bulls of untested stock.

The Selection of a Bull.

We have seen others who while using bulls from tested stock paid no attention to appearance, conformations, or pedigree. I visited a man a short time ago, who, without any previous experience, had started dairying, and had been told that all that he need pay attention to was the test results; he was assured that nothing else mattered. The bull he selected happened to be from what is termed a short-pedigreed cow that had been a good producer; the animal, however, lacked prepotency when mated with pure-bred stock; he was deficient in type, showing traces of grade blood; consequently the resulting progeny are not only lacking in appearance and type, but also in production. A peculiar feature in the heifers is small thin teats, and unless these defects are corrected future progeny will be unsaleable.

Bainfield Netherland Sylvia II.
Owner—Mr. O. Syme, Macedon.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1925–26	12,456	3·69	459·34
1926–27	20,531	3·63	746·02
1928–29	19,365	3·18	615·89

In the choosing of a sire too much care cannot be taken. A correct choice is the essential requirement for success. Some bulls give excellent results on mongrel herds, yet prove failures when used in a pure-bred herd. These animals are usually found to be from short-pedigreed stock. While dominating the mongrel blood, their characteristics are not strongly enough fixed to prevail when mated with pure stock, and they lack prepotency.

A bull showing any sign of impure blood, or whose either parent has revealed any indication of impure blood, should never be used for stud purposes.

So in selecting a sire, the choice is not always made from the heaviest-producing cow. Certainly the dam must be a good producer, but she must also show signs of pure breeding and correct conformation.

In one herd that has come rapidly to the front, and has now reached a 500-lb. standard, none of the bulls used has been selected from the heaviest-producing cow in the herd. The owner while bearing in mind that production is the chief object to be aimed at, has selected animals whose parents were of undoubtedly pure blood, for he knows that if the very best result is to be attained, pedigrees and conformation are essential. The herd has reached a high standard, and should keep on improving.

It is well to remember that the further back we can trace the pedigree of an animal the surer we can feel that the animal will transmit its characteristics. The successful breeder is a careful student of pedigree. An animal inherits its traits from its ancestors. We know that certain families will throw 100 per cent. good stock,

Mr. J. D. Read's Tecoma of Springhurst.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1923–24	5,804	4·96	287·67
1924–25	7,894	5·42	427·83
1925–26	7,917	5·42	429·64
1926–27	9,700	4·99	484·47
1927–28	11,363	4·97	564·86
1928–29	11,984	5·05	607·75

while others, though yielding a large percentage of good animals, may at times produce a duffer. A breeder must learn to know his families and their peculiarities. The majority of our pure-stock-owners, after several years' culling, have now chosen their particular strains, and in each generation the particular characteristics desired will become more intensified, and more likely to be permanent, and the animals more prepotent. The testing of the progeny reveals the powers of transmitting.

The aim of every breeder should be a herd of heavy-producing cows as nearly perfect in type and conformation as possible. Pleasing to the eye, pleasing to the pocket—this is the ideal herd.

Type or Results—Which?

For some years we have heard what might be termed a senseless wrangle going on between a few extremists. A few old conservative breeders declare that cows can be chosen on appearance and type alone for heavy production, but almost with the next breath they say that heavy production ruins type. Sometimes we hear them, perhaps, naming champion producing cows that were winners at the Royal Agricultural Show. Then we have the other extremist imploring people to take no notice of type, shape, or anything else save testing results. He, too, will name cows that have won prizes at the Royal Agricultural Society Show, though they did not prove themselves to be heavy producers. To the beginner it is very puzzling. Our leading breeders go along steadily; they do not talk much, but they act, and are aiming for both production and type, neglecting neither. This

Garenne II. of Bruce Vale.
(First in Senior 4-year-old class.)
Owner—Mr. F. Trevaskis.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1925-26	5,284	7·04	372·19
1926-27	7,052	6·93	488·61
1927-28	8,134	6·45	524·40
1928-29	8,685	7·22	627·22

should be the aim of every breeder. He must strive for the ideal cow—perfect in conformation, according to her breed, and capable of yielding big quantities of butter-fat.

From my work in connexion with the Government Standard Test, and from my knowledge of different breeders' methods, my advice to breeders would be—strive to breed the heaviest-producing cows. Test each cow over a number of consecutive years. Strive to have the most beautiful and perfectly shaped cows in the State. Pay attention to detail in conformation. Correct defects as soon as they appear. Remember, too, that people do not want to buy tough cows (i.e., cows hard to milk), nor cows with short teats, nor sulky and bad-tempered stock.

A cow true to type, showing pureness of blood, and pleasing to the eye, will always command a much higher price than one lacking these characteristics. A breeder is often willing to pay ten, twenty, and thirty guineas more for animals of this type—animals in which he can take a pride, and animals which he knows will usually yield good progeny.

R. M. Washburn, quoting results of tests carried out in the United States of America, maintains that the cows of true dairy type in each case show much greater profit over cost of food consumed than do those of incorrect type.

In the selection of animals the question may be sometimes asked which would one prefer—the resultant progeny from the mating of, say, a bull from ancestors giving 600 lb. of butter-fat, mated to a cow

Mr. J. D. Read's Narcissus of Springhurst.
(First in Junior 4-year-old class.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1926–27	5,859	5·81	340·36
1927–28	7,643	5·66	432·63
1928–29	10,892	5·72	623·53

yielding, say, 250, or the progeny from the mating of animals yielding 400 on each side. Averaging the yields, the result of the first mating should be 425, the latter 400. Personally I would select from the latter mating. I would expect from the progeny an increase of perhaps 50, or even up to 100 lb., and a similar increase from their progeny. In the case of the former mating there would probably be the occasional reversion to the low-producing blood. A lot of valuable information will be collected when the breeding results and records from the past fourteen years of the Government Standard Herd Test can be thoroughly investigated. An attempt has been made to examine the figures for certain results, but the rapidly increasing number of herds under test, together with a shortage in the staff, has made this impossible.

In the using of pure-bred bulls on the ordinary mongred herds a rapid improvement will be effected, and grades are being bred that can give excellent records. However, the ultimate objective of every stock-owner should be a pure-bred herd. The grades and the mongrels will throw a certain percentage of "duds." The purer the blood the surer will be the improvement. This applies to all varieties of stock. We cannot obtain quality, shape, or size with mongrel blood.

Which is the Best Breed?

Dairy supervisors and others are frequently asked which breed they recommend. To that question the usual reply is, "The breed you like best." A man will do much better with stock in which he is

Mr. F. Trevaskis' Model of Ballara.
(First in Senior 3-year-old class.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1926–27	6,786	5·79	393·19
1927–28	8,153	5·50	448·28
1928–29	9,734	6·11	594·75

interested than with those for which he cares less. Each breed has its advocates who will extol the good points of their fancy animals.

The principal dairy breeds in Victoria are the Ayrshire, Friesian, Jersey, and Milking Shorthorns. Guernsey herds are being established, and are being tested. Some Illawarra cattle have been introduced, and one herd is under test. There are also a few Red Polled herds under test. It is pleasing to note that this year there has been a number of entries from young Ayrshire breeders.

How should Calves be Reared?

A question much discussed is, "Does the manner of rearing a calf influence its subsequent milking characteristics? Of course, we know

that the factor for production must be transmitted to an animal from its ancestors, but can we hinder or assist that characteristic by our method of rearing the calf ? For instance, if a calf were given whole milk, and run on good pastures, it would be kept in prime condition and gradually would develop thick fleshy thighs, heavy shoulders and brisket; its body would be rounder and smaller than that of a good milking cow, and it would show many of the characteristics of the beef animal.

The animals reared in a nice thrifty condition develop a deep capacious body, lean shoulders and thighs, with plenty of udder room, and they grow more into the type of a milker. From the observations I have been able to make I would say that the heifer kept in an over-

Wynette of Somerville.
Owners—Messrs. J. Hutchinson and Sons.
(First in Junior 3-year-old class.)

Season.	Milk.	Test.	Butter-fat.
	lb.		lb.
1926–27	7,188	5	402·97
1928–29	10,777	5·25	565·71

fed condition does not develop into as good a cow as the one maintained in a nice healthy, medium condition; therefore, I suggest that calves be kept in something approximating this last-named condition.

The Year's Work.

Last year the number of cows under test almost doubled, and owing to sickness of some of those engaged in testing, and the enforced absence for weeks at a time of one of the staff on the Better-Farming Train, it has been very difficult to keep the records up to date, and this has been possible only by the hard and loyal service of all those associated with the work.

The 1928-29 Season.

The 1928-29 season was a more satisfactory one for dairy farmers than the two preceding ones. The continued improvement of herd averages shows that we are building on sound lines. The fine performances of our two-year-olds is to me the most pleasing feature. They will form our future herds, and so results are most reassuring. In judging a herd, one must always look at the results from heifers to ascertain if a man's breeding methods are on right lines. If the heifers are not yielding well I would never recommend the purchase of a sire from that herd.

The Leading Cows in the 1928-29 Test.

The leading cows in the various sections of last year's test were:—

Mature Class—Fairy of Willow Park, 731.97 lb. of butter-fat.
Senior 4 Class—Garenne 2nd of Bruce Vale, 627.22 lb. of butter-fat.
Junior 4 Class—Narcissus of Springhurst, 623.53 lb. of butter fat.
Senior Class 3—Model of Ballara, 594.75 lb. of butter-fat.
Junior 3 Class—Wynette of Somerville, 565.71 lb. of butter-fat.
Senior 2 Class—Peggy 3rd of Belgonia, 546.79 lb. of butter-fat.
Junior 2 Class—Aveley Norma 2nd, 508.91 lb. of butter-fat.

New Herds Entered for 1929-30 Test.

The following new entries were accepted during the year:—

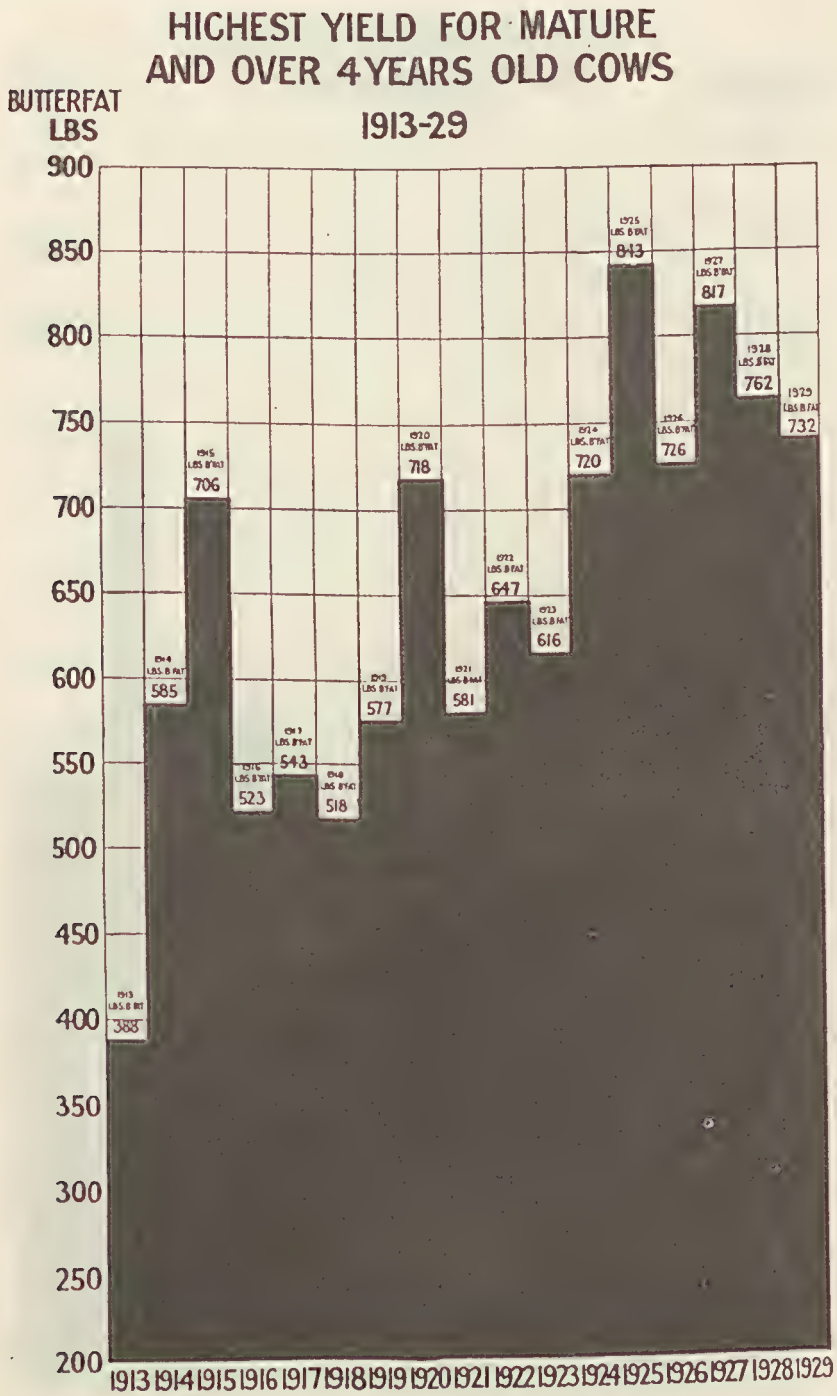
N. Alston, Jersey, Romsey.
G. H. Bellfield, Jersey, Colcraine.
Ballarat Orphanage, Jersey, Ballarat.
A. V. Beecher, Friesian, Welshpool.
L. W. R. Colenso, Jersey, Alvie.
C. Chitty, Jersey, Kernot.
A. Cox, Jersey, Kyabram.
Chester Bros., Jersey, Kyabram.
A. B. Clarke, Jersey, Noorat.
W. J. Clarke, Jersey, Monomeith.
Cameron and Smith, Red Poll, Orbost.
C. Coughlin, Jersey, Yannathan.
A. Z. Calder, Jersey, Springhurst.
J. J. Desmond, Jersey, Rochester.
E. E. Davis Jersey, Bass.
R. J. Dobson, Jersey, Acheron.
T. G. Dellar, Jersey, Portland.
Dunbar Bros., Friesian, Carlsruhe.
T. J. Edwards, Jersey, Myrtle Bank.
F. W. Gread, Jersey, Tongala.
R. G. Gay, Jersey, Yarram.
L. W. C. Holbing, Jersey, Tongala.
W. T. Jephson, Jersey, Gelliondale.
Koenig Bros., Jersey, Mooroopna North.
K. D. Lane, Jersey, Merino.
O. Leemon, Jersey, Archie's Creek.
A. A. McInnes, Milking Shorthorn, Gunbower.
Dr. Mailer, Jersey, Shepparton.
S. Meadowcroft, Jersey, Stanhope.
E. M. Middleton, Jersey, Hamilton.
R. K. Milne, Jersey, Camperdown.
V. J. Mason, Ayrshire, Lower Ferntree Gully.
A. R. Marshman, Jersey, Archie's Creek.
C. Nathan, Jersey, Tongala.
L. Neylands, Jersey, Ballarat.
J. Powell, Jersey, Camperdown.
J. Pearson, Jersey, Nerrena East.
A. Prout, Jersey, Leongatha.
S. A. Ross, Jersey, Tarwin.
D. M. Ryan, Illawarra, Pirron Yallock.
J. R. Smethurst, Jersey, Thorpdale.
E. T. Searle, Milking Shorthorn, Edi Upper.
F. E. Vale, Jersey, Yarram.
D. Wadelton, Ayrshire, Loch.
H. Watson, Jersey, Leongatha.
A. W. White, Milking Shorthorn, Echuca.
J. Watts, Jersey, Stanhope.

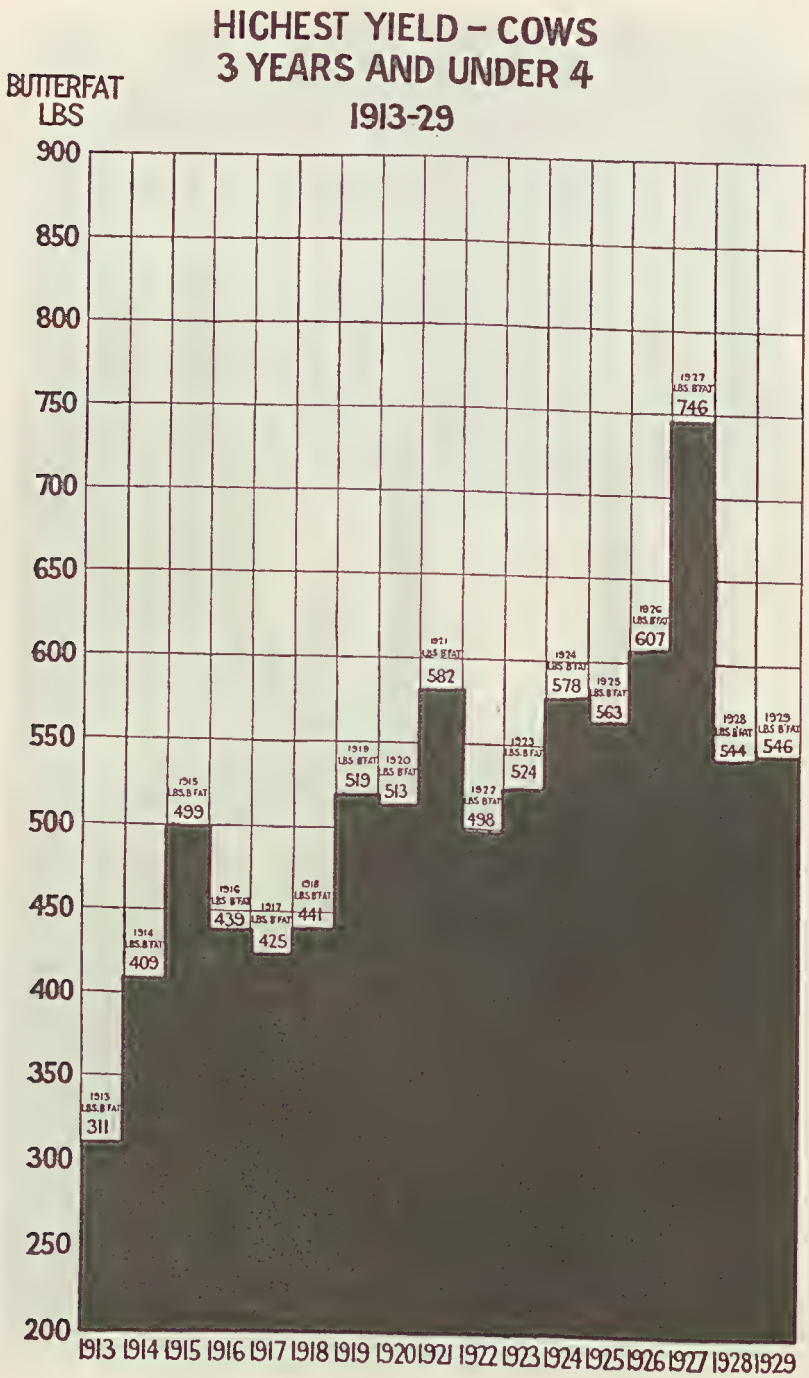
Mr. P. J. Maloney's Peggy 3rd of Belgonia.
(First in Senior 2-year-old class.)

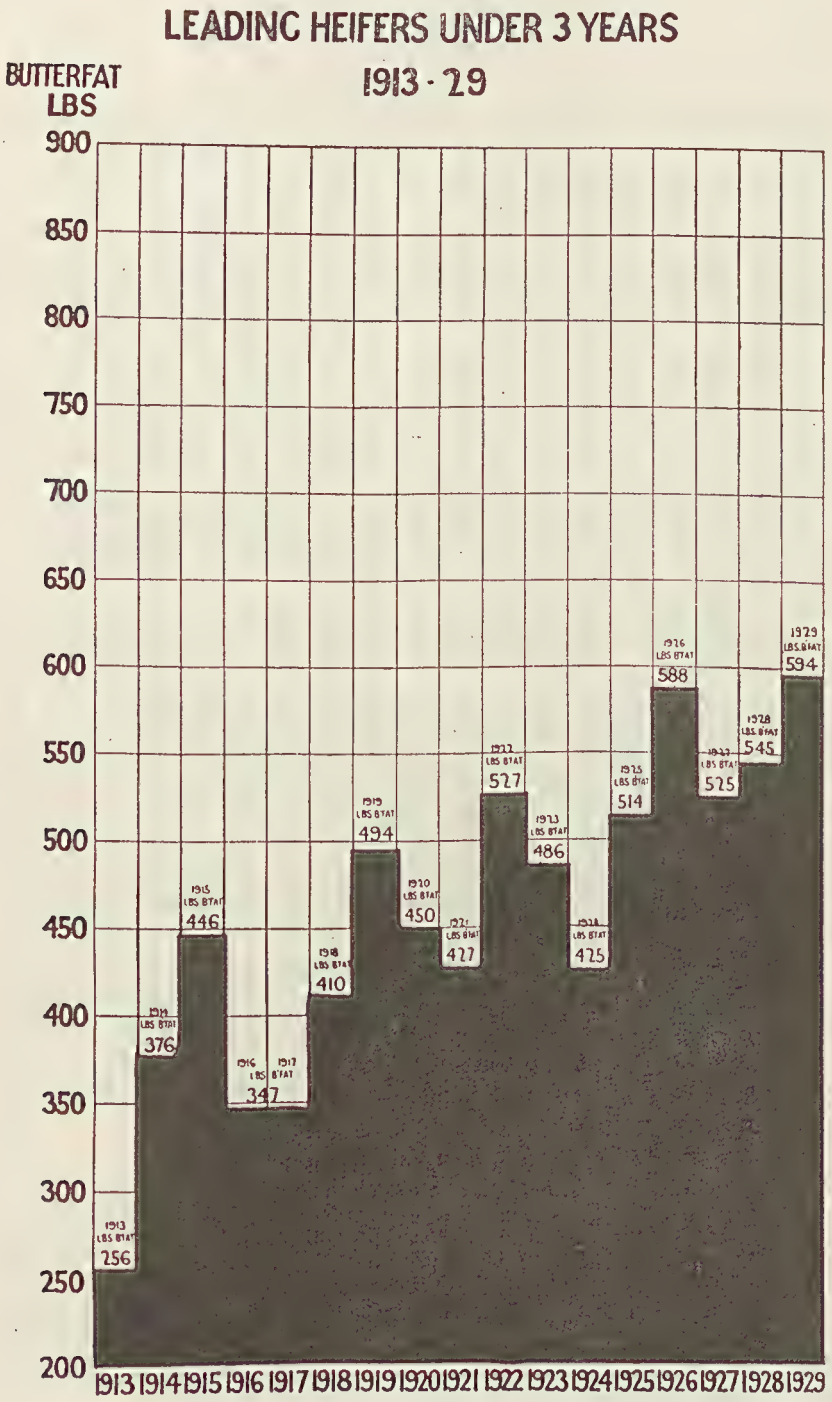
Season.	Milk. lb.	Test.	Butter-fat. lb.
1927–28	9,120	4·90	446·82
1928–29	10,243	5·43	546·79

Mr. W. P. Rogan's Aveley Norma 2nd.

Season.	Test. lb.	Test.	Butter-fat. lb.
1928–29	8,319	6·12	508·91


HIGHEST YIELD FOR MATURE
AND OVER 4 YEARS OLD COWS
1913-29
BUTTERFAT
LBS
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
1913 LBS B'FAT 388
1914 LBS. B FAT 585
1915 LBS B'FAT 706
1916 LBS B'FAT 523
1917 LBS. B'FAT 543
1918 LBS B'FAT 518
1919 LBS B'FAT 577
1920 LBS. B'FAT 718
1921 LBS. B'FAT 581
1922 LBS B'FAT 647
1923 LBS. B'FAT 616
1924 LBS. B'FAT 720
1925 LBS B'FAT 843
1926 LBS. B'FAT 726
1927 LBS B'FAT 817
1928 LBS B'FAT 762
1929 LBS B FAT 732
1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929


HIGHEST YIELD – COWS
3 YEARS AND UNDER 4
1913-29
BUTTERFAT
LBS
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
1913 LBS. B'FAT 311
1914 LBS. B'FAT 409
1915 LBS. B'FAT 499
1916 LBS. B'FAT 439
1917 LBS. B'FAT 425
1918 LBS. B'FAT 441
1919 LBS. B'FAT 519
1920 LBS. B'FAT 513
1921 LBS. B'FAT 582
1922 LBS. B'FAT 498
1923 LBS. B'FAT 524
1924 LBS. B'FAT 578
1925 LBS. B'FAT 563
1926 LBS. B'FAT 607
1927 LBS. B'FAT 746
1928 LBS. B'FAT 544
1929 LBS. B'FAT 546
1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929


LEADING HEIFERS UNDER 3 YEARS
1913 - 29
BUTTERFAT LBS
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
1913 LBS BTAT 256
1914 LBS BTAT 376
1915 LBS BTAT 446
1916 LBS BTAT 347
1917 LBS BTAT
1918 LBS BTAT 410
1919 LBS BTAT 494
1920 LBS BTAT 450
1921 LBS BTAT 427
1922 LBS BTAT 527
1923 LBS BTAT 486
1924 LBS BTAT 425
1925 LBS BTAT 514
1926 LBS BTAT 588
1927 LBS BTAT 525
1928 LBS BTAT 545
1929 LBS BTAT 594
1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929

Special Herd Record Prizes.

Champion Herd, Prize £20.

Reserve Champion Herd, Prize £10.

To be awarded to the herds giving the greatest and second greatest average under the Herd Testing regulations. Minimum number of cows competing in the test during the year, ten.

Such herd to average not less than 300 lb. of butter-fat.

Handicaps to be allowed on the following scales. In a herd of more than ten, each cow shall receive an allowance equivalent to ½ lb. of butter fat for each cow in the herd. Allowances according to class :—

Junior two-year-old, 150 lb.; senior two-year-old, 125 lb.

Junior three-year-old, 100 lb. ; senior three-year-old, 75 lb.

Junior four-year-old, 50 lb.; senior four-year-old, 25 lb.

Three best cows in winning herd to be exhibited at Royal Agricultural Show of that year.

The Champion Herd prize has been won by P. J. Maloney's Jersey herd. Average yield per cow, 579.69 lb. of butter-fat. The prize for Reserve Champion Herd goes to Mr. Trevaskis's Jersey herd. Average yield per cow being 553.57 lb. butter-fat.

Grand Champion prize of £100 to be awarded to the cow securing the position of Annual Champion for three years, not necessarily in succession. Not yet won.

Annual Champion Cow under Herd Test regulations, prize of £10. To be awarded to the cow yielding the greatest amount of butter-fat during a lactation period terminating within the year ending on the 30th of June, under the Department of Agriculture's Standard Herd Test regulations and calving again within fifteen months from previous calving date. If two lactations are completed within the year the last will be considered. Cow to be exhibited at the Royal Agricultural Show of that year. Won by Mr. W. K. Atkinson's Milking Shorthorn Cow, Fairy of Willow Park, 731.97 lb. of butter-fat.

Annual Reserve Champion Cow, under Government Standard Herd Record regulations. For cow attaining second place, and calving again in fifteen months from previous calving date. Cow to be exhibited at Royal Agricultural Show of that year.

Won by Messrs. Smith and Sons' Friesian cow, Halecoat Oakleaf Fobes, 676.77 lb. of butter-fat.

A Full List of Competitors.

A list setting out in order of merit the names of all the cows competing in the 1928-29 test is being issued as a supplement to this issue.

This supplement, together with the usual list of competing herds, grouped alphabetically according to owner's name, will be reprinted in pamphlet form, and, as in past years, free copies will be available for those applying for them.

Average in Detail of Herds which Averaged over 350 lb. Butter-fat per Cow.

Owners.	Breed.	Junior 2-year-old.		Senior 2-year-old.		Junior 3-year-old.		Senior 3-year-old.		Junior 4-year-old.		Senior 4-year-old.		Mature.		Total.	Without allowances.	With allowances.
		No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.		Average.	Average.
1. P. J. Maloney ..	Jersey ..	3	393·77	1	546·79	3	519·32	..	..	2	570·78	1	537·27	6	530·37	16	509·19	579·69
2. F. Trevaskis ..	,, ..	3	355·34	3	422·39	..	..	2	534·23	..	..	1	627·22	2	499·98	11	457·17	553·57
3. O. J. Syme ..	Friesian..	2	336·14	1	401·24	..	..	1	554·72	2	542·77	2	470·32	8	521·24	16	489·02	537·64
4. J. D. Read ..	Jersey ..	5	295·11	3	418·37	2	499·82	1	486·99	3	540·90	1	488·02	7	500·55	22	446·93	529·51
5. N. H. Enders ..	,, ..	4	331·76	1	508·67	1	475·30	..	..	..	..	..	..	5	516·03	11	444·65	525·15
6. F. Austin	,, ..	6	329·40	4	410·62	2	376·19	2	517·99	1	371·10	2	522·32	2	484·33	19	410·09	516·95
7. Department of Agriculture	Friesian..	..	..	1	413·04	1	253·98	2	349·49	1	528·37	2	563·03	3	543·96	10	465·24	512·74
8. E. J. Vagg.. ..	Jersey ..	3	332·69	2	393·08	3	381·58	2	417·24	2	474·28	..	..	1	374·75	13	391·43	494·08
9. C. Gordon Lyon ..	,, ..	8	340·59	..	..	3	434·80	..	..	2	406·02	3	481·60	11	449·40	27	415·90	491·44
10. Trevor Harvey ..	,, ..	2	319·54	1	303·83	2	387·28	2	433·02	1	541·84	1	502·06	6	454·35	15	423·57	487·73
11. A. A. Broad ..	,, ..	2	335·56	..	..	..	..	2	424·06	..	..	..	..	7	463·09	11	432·80	479·21
12. A. J. Mapleson ..	,, ..	1	362·87	1	418·20	1	264·41	4	332·00	1	368·42	1	383·44	11	453·40	19	426·99	475·96
13. T. Mesley	,, ..	3	278·78	1	309·87	1	410·23	..	..	2	392·78	..	..	5	496·30	12	401·96	472·54
14. Handbury and Sons..	,, ..	6	279·64	3	344·82	1	355·42	4	320·32	1	527·61	..	..	2	637·35	17	361·84	471·81
15. J. A. Huffer ..	,, ..	6	314·79	1	360·46	1	307·85	3	445·46	1	472·04	..	..	4	412·17	16	375·88	471·38
16. J. Clyne	,, ..	1	199·93	6	353·49	2	433·45	1	316·80	1	430·94	..	..	3	438·95	14	375·17	469·67
17. W. A. Axford ..	,, ..	3	328·26	3	364·67	3	405·72	2	376·47	..	..	1	378·77	5	416·59	17	382·97	467·94
18. J. McDougal ..	,, ..	5	321·53	1	347·97	1	433·92	1	366·99	1	418·92	1	386·77	2	422·86	12	367·33	467·08
19. C. W. Macauley ..	,, ..	5	296·68	2	369·30	..	..	2	385·06	..	..	1	484·16	..	..	10	347·63	465·13
20. Simpson & Son ..	,, ..	3	322·09	1	332·27	1	388·75	1	284·21	2	369·89	1	356·15	5	474·53	14	388·58	458·08
21. McWhae and Sylvester	Guernsey	7	272·10	2	413·49	3	392·20	1	286·80	..	..	1	383·02	..	..	14	327·01	455·44
22. R. M. Chirnside ..	Jersey ..	4	341·13	3	336·31	..	..	3	331·56	..	..	..	..	2	391·01	12	345·85	451·85
23. T. R. Findlay ..	,, ..	..	..	3	353·05	1	324·18	3	426·96	..	..	3	352·22	1	412·38	11	375·75	451·70
24. McNabb & Son ..	,, ..	3	288·32	3	349·18	5	355·16	3	322·13	1	476·33	1	435·92	4	402·44	20	358·83	450·08
25. R. Maher	,, ..	3	349·06	1	317·29	..	..	..	..	1	371·21	..	..	5	422·30	10	384·72	447·22
26. J. V. M. Wood ..	,, ..	5	283·90	2	387·41	..	..	2	401·13	1	384·45	2	432·26	3	358·41	15	354·72	445·55
27. Cameron and Sons ..	,, ..	..	..	2	400·28	3	254·43	..	..	..	..	1	427·93	4	462·75	10	384·28	441·78
28. Warragul High School	Red Poll	4	258·29	3	360·03	1	238·07	..	..	1	373·44	..	..	2	471·13	11	333·36	441·14
29. E. J. Howlett ..	Jersey ..	2	235·47	2	330·92	1	342·04	1	405·70	1	468·36	3	379·03	4	442·50	14	375·42	441·00
30. J. Plattfuss ..	Friesian..	4	350·35	3	281·42	2	227·14	2	347·10	1	304·26	3	468·06	6	406·21	21	359·04	438·59
31. H. Atherton ..	Jersey ..	4	300·92	2	440·54	2	335·52	1	342·73	1	317·52	..	..	5	359·17	15	347·46	433·29
32. Mrs. E. Lennie ..	,, ..	2	271·79	3	367·95	..	..	1	301·92	2	302·93	3	377·92	2	465·27	13	355·35	433·00
33. W. H. Hurrey ..	,, ..	1	285·61	2	350·52	3	340·69	2	328·45	1	322·03	..	..	1	405·95	10	339·36	429·36
34. Gibson Bros. ..	,, ..	1	258·25	3	294·37	..	..	2	311·75	7	376·61	3	404·05	7	410·19	23	368·89	428·22
35. G. Esler	,, ..	2	332·24	2	344·36	..	..	..	..	2	373·31	1	426·75	5	367·30	12	363·59	425·84
36. C. Wade	,, ..	3	261·12	2	339·14	1	252·79	2	369·17	..	..	..	..	3	402·13	11	332·65	424·51
37. Mrs. A. Black ..	,, ..	1	269·39	5	319·19	..	..	1	219·56	1	440·95	1	268·66	1	514·25	10	330·87	423·37
38. F. Bidgood ..	,, ..	2	336·44	2	289·81	1	347·33	1	384·54	1	411·92	..	..	4	354·20	11	346·67	422·03
39. Department of Agriculture	Red Poll	3	250·47	2	315·26	..	..	6	366·08	4	366·28	5	359·62	21	380·67	41	361·85	418·32

AVERAGE IN DETAIL OF HERDS WHICH AVERAGED OVER 350 LB. BUTTER-FAT PER COW—*continued.*

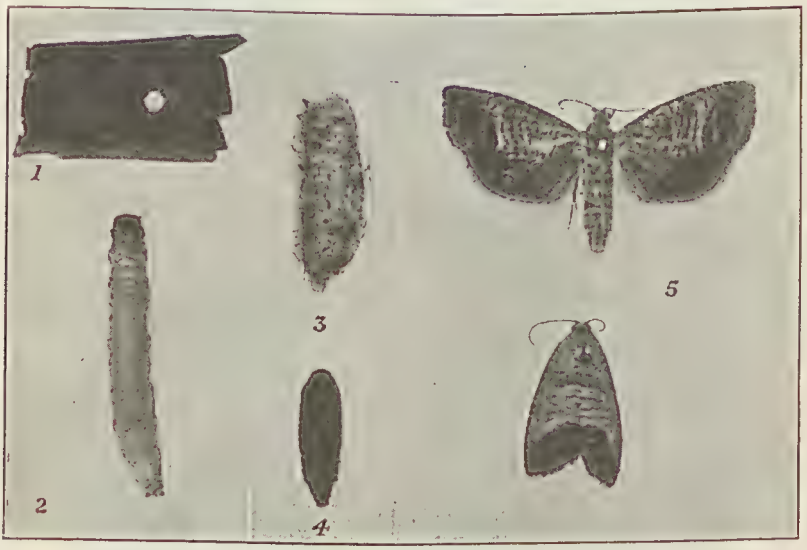
Owners.	Breed.	Junior 2-year-old.		Senior 2-year-old.		Junior 3-year-old.		Senior 3-year-old.		Junior 4-year-old.		Senior 4-year-old.		Mature.		Total.	Without allowances.	With allowances.
		No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.		Average.	Average.
40. A. E. Ellis.. ..	Jersey ..	5	299·83	1	283·73	3	308·74	1	324·69	1	352·56	1	430·53	4	351·28	16	326·37	417·19
41. W. K. Atkinson ..	Milking Shorthorn	8	267·39	6	276·87	3	373·05	4	302·18	8	308·66	3	377·91	11	378·12	43	323·03	414·88
42. W. Woodmason ..	Jersey ..	5	256·26	2	288·94	3	323·94	2	395·20	3	346·32	3	398·87	13	370·16	31	344·16	413·69
43. W. Henderson (Home Farm)	Ayrshire	4	282·28	3	345·51	1	260·06	..	..	1	446·81	2	336·89	15	377·42	26	354·14	412·33
44. J. Anderson, jun. ..	Jersey ..	4	277·73	1	172·40	4	326·93	..	..	1	373·04	..	..	4	369·20	14	317·21	408·14
45. Mrs. L. Lowing ..	,, ..	4	263·14	2	235·10	2	352·55	3	331·27	1	245·14	3	351·16	4	379·06	19	317·71	400·90
46. Cockbill Bros. ..	Ayrshire	9	225·11	5	308·10	..	..	..	..	2	324·45	1	189·89	5	397·18	22	290·51	396·97
47. E. Nicholls ..	Jersey ..	3	271·34	1	303·07	..	..	5	301·46	..	..	..	..	1	381·13	10	300·55	395·55
48. P. Ducat	,, ..	1	132·74	2	278·02	2	347·13	1	371·99	2	380·35	2	265·72	3	393·73	13	325·26	395·22
49. F. J. Tuckey ..	Ayrshire	2	289·68	1	327·47	..	..	2	337·96	..	..	..	..	5	353·97	10	335·26	392·76
50. Dookie College ..	,, ..	4	277·50	3	341·16	..	..	1	324·82	..	..	1	148·40	3	317·02	12	296·48	392·07
51. T. Knowles ..	,, ..	5	282·26	..	..	4	307·87	2	303·53	..	..	..	..	3	279·55	14	292·03	391·89
52. J. L. Gardener ..	Jersey ..	3	225·08	1	299·44	..	..	1	294·01	..	..	..	..	8	348·58	13	312·10	368·60
53. H. Webb	Ayrshire	2	161·78	3	263·99	1	288·33	2	308·33	2	301·04	..	..	3	345·95	13	281·57	366·92
54. W. Parbury ..	Jersey ..	5	233·81	5	272·72	4	215·62	2	334·34	..	..	3	310·80	7	301·06	26	273·22	363·14
55. J. T. Tweddle, Berwick	Friesian..	4	263·73	1	168·83	1	238·23	..	..	1	332·84	..	..	9	332·10	16	298·98	361·67
56. A. W. Gorman ..	Ayrshire	1	219·37	1	220·67	1	263·98	1	287·99	2	295·43	2	337·61	3	332·87	11	296·06	356·11

CONTROL OF THE CODLING MOTH.

(Cydia Pomonella Linn).

By G. T. Levick, B.Ag.Sc., Assistant to Entomologist.

During recent years fruit-growers in Victoria have had increasing difficulty in obtaining a satisfactory control of codling moth. The loss due to the moth is estimated at 7 per cent. of the apple crop in the State, while at Harcourt, the chief apple-growing centre in Northern Victoria, the average loss is at least 15 per cent. Last season, owing mainly to the abnormally light crop at Harcourt, amounting to only about one-tenth of a normal one, the loss due to codling is estimated to be in the region of 60 per cent.



The Codling Moth.

1.—Egg on piece of leaf. 2.—Larva or grub. 3.—Cocoon. 4.—Pupa or resting stage. 5.—Adults.

(All magnified two and a half times.)

[Photograph by G. T. Levick.

The partial failure to control the pest in spite of numerous applications of arsenate of lead, which for many years gave very satisfactory control, is difficult to account for. It has been suggested that the spray material is at fault, and that the continuous use of lead arsenate has led to the evolution of a strain of moths partially immune to arsenical poisoning.

There appears to be no foundation for regarding the spray materials as inferior, since chemical analyses have shown, (*a*) and (*b*), that the arsenate of lead is of satisfactory quality, while spraying machinery has been considerably improved.

On the other hand, experiments by an American worker (*c*) have indicated that there are different strains of the codling moth, and some of them are able to enter apples sprayed with an arsenical poison,

and that the successful strains are evolved in districts where heavy arsenical sprays have been used for a considerable period. The results of this work agree with practical experience in this country.

Arsenical Spraying.

The codling moth was established here as a serious pest in apples at a very early date, but the first recorded spraying experiments (*d*) in its control were carried out by the Agricultural Department in the season 1901-2. These experiments were begun at Bendigo, Harcourt, Strathfieldsaye, and in the vicinity of Melbourne, and the materials used were paris green and white arsenic. Lime was added in each case to decrease liability to burn. The block selected at Harcourt was, strangely enough, the identical block chosen when spraying experiments were again initiated a quarter of a century later.

The experiments were successful, showing that the percentage of codling infested fruits could be reduced from 40 per cent. or 60 per cent. down to 10 per cent. or less.

Shortly after this it became the practice to add lead acetate to the arsenic-washing soda-lime mixture, obtaining a lead arsenite. Though this mixture gave good results, troubles caused through faulty mixing, &c., were of constant occurrence.

Following experiments in America, about 1905 the Department recommended lead arsenate, and a number of brands appeared on the market. This material has been the standard spray ever since. Early analyses show marked variations in the strengths of the lead arsenates, but the chemicl constituents have now been more or less standardized, and are approximately the same in all makes. The physical properties, such as the rate of settlement, still show variations.

In the last few years the action of the Imperial authorities in insisting on a low maximum amount of residual arsenic on apples (0.01 grains per lb.) has lead to extensive experiments being carried out in all apple-growing countries, either by treatment to remove the arsenic, or by substitution of some other material for arsenic.

In America the treatment of fruit after picking for removal of arsenic has been brought to a fair state of efficiency. A washing solution of hydrochloric acid is the process recommended.

The use of summer spraying oils has been tested, and American experiences indicate that they may be used in combination with lead arsenate to increase the efficiency of the sprays.

It has been shown that many codling moth eggs are killed with a 1 per cent. solution, and all are killed with a 2 per cent. solution of summer spraying oils, which also act as repellants to a certain extent (*e*) and (*f*).

Experiments in New South Wales have also shown the value of summer spraying oil as an ovicide.

Experiments at Harcourt.

In this State, however, little has been done in the direction of removal of spray residue apart from the mechanical wiping of apples showing visible traces of arsenate of lead. Experimental work has been designed mainly with the object of increasing the efficiency of codling moth sprays and at the same time of bringing the residual arsenic content so low that no treatment is necessary.

During the last three seasons the writer has carried out spraying experiments at Harcourt with this object, and some useful results have been obtained, although the importance of these has been minimized by the fact that the three seasons that the experiments have been running, have been very abnormal. The season 1926-27 was the so-called "thrip year," when the crop was reduced to about 20 per cent. of a normal one. 1927-28 resulted in an exceptionally large crop, while in 1928-29 the apple crop was practically a complete failure. Details of the results of the 1928-29 experiments are given on pages 536-7.

Type of Breeding Cage used in Codling Moth Experiments at Harcourt.

The experimental block is situated on Mr. T. Code's property at Harcourt, and consists of two acres of apple trees approximately 30 years old of mixed varieties. In practically all cases the ordinary orchard motor spray pump was used, with spray gun attachments at a pressure of around 250 lb. per square inch. Paste arsenate of lead was used throughout.

Estimation of Results.

In the case of blocks consisting of less than 30 trees an actual count of all apples from each tree was taken, including windfalls.

Where the blocks were larger, the results were taken from the number of cases from each, the apples from which were of fruit sorted out into those injured by codling moth and those not. No distinction was made between fruit with one, two, or more entrances, nor between fruit with entrances and stings, if the latter caused a blemish rendering the fruit unfit for export. All sorting and counting was done by the writer.

Time of Applying Sprays.

The first or calyx spray was applied when the petals had fallen from the majority of the blossoms. The timing of the cover sprays were determined by observations—

(*a*) of the presence of codling moths in the orchard;
(*b*) of the emergence of moths from cocoons in a breeding cage located beneath a tree in the orchard;
(*c*) of the number of moths caught in traps, baited with fermented apple juice, which were suspended in unsprayed trees.

Four cover sprays were found necessary.

Codling Moth Experiments 1928-29.

All sprays were applied with a spray gun at a pressure of about 250 lb. per square inch, except where otherwise shown.

Section 1.—Test of Sprays other than Arsenicals.

Spray No.	Material.	Date of Application.
	Block A.—Control.	
1	Arsenate of lead, 5 lb. in 80 gallons of water	23.10.28
2	" " " " "	31.10.28
3	" " " " "	20.11.28
4	" " " " "	20.12.28
5	" " " " "	20.1.29
	Block B.—Lead Followed by Oil.	
1	Arsenate of lead, 5 lb. in 80 gallons of water	23.10.28
2	" " " " "	31.10.28
3	Volck oil, 1 in 40	20.11.28
4	" "	11.12.28
5	" "	10.1.29
6	" "	8.2.29
	Block C.—Oil Alone (Applied with Hand Pump).	
1	Volck oil, 1 in 40	19.10.28
2	" "	16.11.28
3	" "	11.12.28
4	" "	10.1.29
5	" "	5.2.29
	Block D.—Helebore.	
1	Helebore powder, 5 lb. in 80 gallons of water	23.10.28
2	" " " " "	31.10.28
3	" " " " "	20.11.28
4	Experiment abandoned.	

SECTION II.—TEST OF OVICIDAL SPRAYS, COMBINED WITH ARSENICALS.

Spray No.	Material.	Date of Application.
	Block E.—Lead and Oil.	
1	Arsenate of lead 5 lb., volck oil 1 gallon, in 80 gallons of water	23.10.28
2	,, ,, ,, ,, ,, ,, ,,	20.11.28
3	,, ,, ,, ,, ,, ,, ,,	20.12.28
4	,, ,, ,, ,, ,, ,, ,,	20.1.29
	Block F.—Not Carried Out.	
	Block G.—Control.	
1	Arsenate of lead, 5 lb. in 80 gallons of water	31.10.28
2	,, ,, ,, ,, ,, ...	27.11.28
3	,, ,, ,, ,, ,, ...	20.12.28
4	,, ,, ,, ,, ,, ...	20.1.29
	Block H.—Unsprayed Controls.	

TIME OF APPLYING SPRAYS.

All sprays were first applied as calyx sprays when the majority of petals had fallen. The timing of the first and second cover spray was determined from observations (1) of codling moths in the orchard, (2) of the emergence of moths from cocoons in a breeding cage located under a tree in the orchard, (3) of the number of moths caught in traps, baited with fermenting apple juice, which were suspended in unsprayed trees.

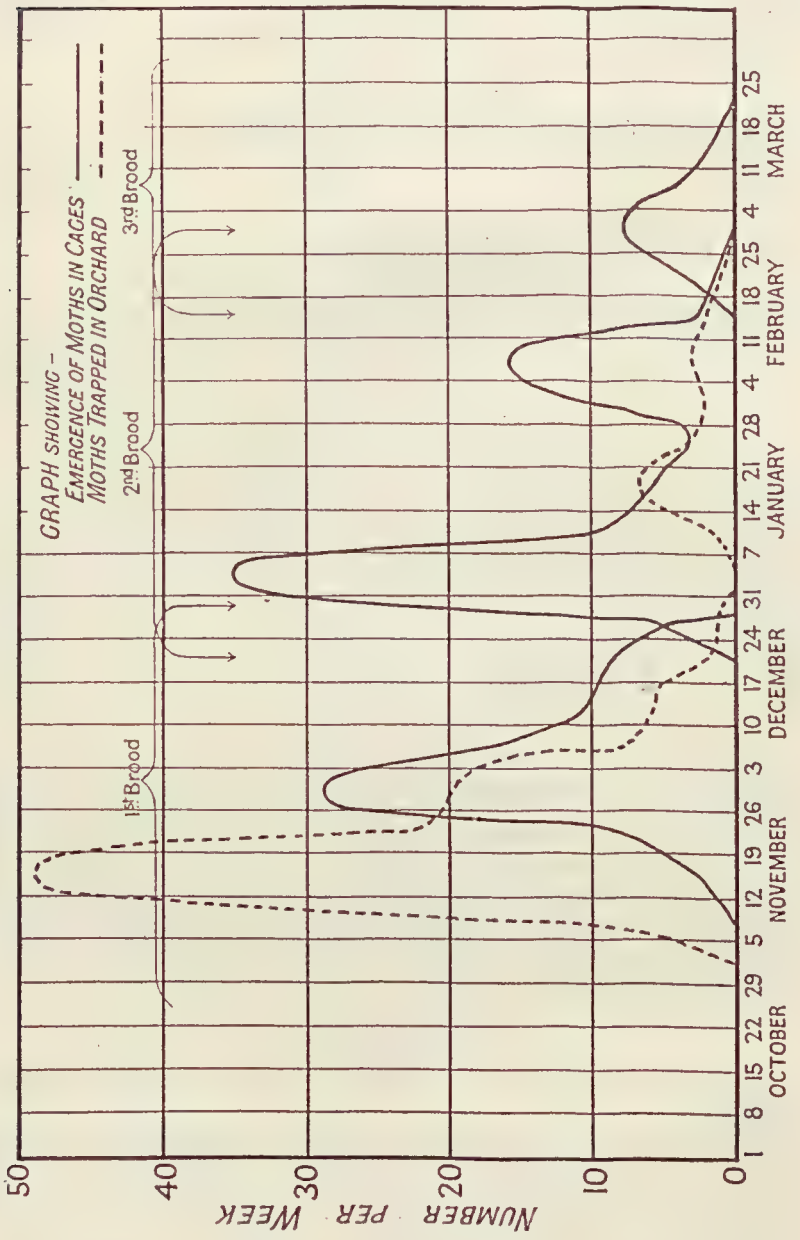
It was noticed that the emergence of the first brood moths in the breeding cage was approximately two weeks later than in the orchard, as determined by moths in traps, though the second brood gave a very similar period of maximum emergence in both cases (see graph, page 538). Towards the end of the season the traps failed to attract the moths, probably owing to the number of apples on the unsprayed trees which, riddled through and through with grub, had began to rot. These would, of course, have an attraction for the moths similar to that of the fermenting apple juice in the traps.

RESULTS.

In all cases percentages were computed from actual count of apples on each tree.

All blocks showed an abnormal amount of codling owing to a large carryover of codlings from the exceptionally bountiful crop the year before, and owing to the present season's crop being so small that commercially it would not have been worth spraying.

Trees were examined on the 17th of December, and a count of codling infection made. This would represent infection from the first brood.


GRAPH SHOWING –
EMERGENCE OF MOTHS IN CAGES ——
MOTHS TRAPPED IN ORCHARD - - - - -
1st Brood
2nd Brood
3rd Brood
NUMBER PER WEEK
0
10
20
30
40
50
1 8 15 22 29 5 12 19 26 3 10 17 24 31 7 14 21 28 4 11 18 25 4 11 18 25
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH

Block.	Material.	Percentage of Codling on 17.12.28.	Percentage of Codling at Picking Time.
		%	%
A	Arsenate of lead	9·8	60·3
B	Oil after lead	3·1	19·3
C	Oil	5·6	52
D	Hellebore	35	abandoned
E	Lead and oil	8·6	53
G	Lead	11·3	56
H	Unsprayed	43	100

These results emphasize the conclusions drawn last year,* namely:—(1) arsenate of lead alone fails to give a satisfactory control; (2) arsenate of lead sprays followed by Volck oil at a strength of 1 gallon in 40 gallons of water again gave a very marked increase in efficacy over any other sprays.

Hellebore, under the conditions of last season, is quite useless; the percentage of infestation up to the time the experiment was abandoned being little different from that of the unsprayed controls.

Volck spraying oil used alone at monthly intervals with the object of killing eggs and/or newly-hatched larvae, proved ineffectual, although early in the season it looked extremely promising.

Oil mixed with the arsenate of lead spray at a strength of 1 gallon in 80 gallons had little, if any, beneficial effect.

It is difficult to account for the fact that while either lead or oil, applied singly, is not satisfactory, yet two sprayings of arsenate of lead, followed by monthly sprayings of oil alone, have given very good results during both years that this system has been used. As analyses have shown moderate amounts of residual arsenic on these apples, it may be possible that the oil holds the arsenical spray on the apple, affording a complete film of protection as the fruit grows, while the oil itself serves to repel the egg-laying moth as well as sterilizing eggs laid about the same time as the oil is applied.

A possible reason for the lead and oil mixture being ineffective is that the oil spray (1 gallon in 80) may be too dilute to form a complete film on the foliage and fruit on the tree.

Summary of Results of Spraying Experiments, 1926-29.

(1) Arsenate of lead alone gave the following results:—

1926-27 .. 22% codling (light crop).
1927-28 .. 13% codling (heavy crop).
1928-29 .. 58% codling (exceptionally light crop).

(2) Two years tests showed that an increase in the strength of arsenate of lead from 5 lb. to 8 lb. to 80 gallons of spray did not give improved control.

(3) The addition of nicotine sulphate and lime sulphur to the arsenate of lead spray did not increase its efficiency.

(4) The addition of 1 gallon of white oil emulsion to 80 gallons of arsenate of lead spray gave only very slightly improved control (one season only). In addition, a higher residual arsenic content was

* See this *Journal* for August, 1928.

found in the apples at picking time. Some oils and lead arsenates were found to give an unsatisfactory result when used together, coagulation taking place almost immediately.

(5) White oil emulsion alone at a strength of 2½ per cent. (five applications) did not give results as favorable as a similar number of sprayings of arsenate of lead (one season only).

(6) Helebore, 5 lb. in 80 gallons, gave results little better than unsprayed controls.

(7) A calyx spray is essential. In 1926-27 the percentage of the first brood entering through the calyx of fruit without calyx spray varied from 33 per cent. to 50 per cent. They were almost completely controlled with a spray of 8 lb. of lead in 80 gallons, applied when the petals had fallen from the majority of the blooms.

Two calyx sprays, each of 5 lb., of arsenate of lead (one applied a week later than the other), were later found to be equally effective, and are likely to be more efficient in ordinary orchard practice.

(8) Two calyx sprays of arsenate of lead 5 lb. in 80 gallons followed by three applications of white oil emulsion, 2½ per cent., gave a very appreciable increase in control over arsenate of lead.

Over two seasons the following average results were obtained:—

Arsenate of lead, 36 per cent. codling.

Arsenate of lead calyx sprays followed by white oil, 12 per cent. codling.

Conclusions and Recommendations.

The control of the first brood of codlings is absolutely essential if heavy loss of fruit late in the season is to be avoided.

Orchard sanitation is a very important feature in codling moth control, and frequently the most neglected. The high percentage of infection in the vicinity of fruit houses and packing sheds, often in spite of extra sprays, shows very clearly that sprays, however carefully applied, cannot cope with the pest unless the orchard is kept clean.

At the end of each season the orchardist should take particular care to free his packing sheds and surroundings from the codling grubs which have crawled from infected apples and made cocoons in cracks and sheltered places. The provision of moth-proof fly-wire screens over doors and windows of packing sheds to prevent egress of emerging moths is a simple and inexpensive method wherever practicable.

As most windfalls are affected with codling moth, they should be gathered up once a week during the apple-growing season, and destroyed by burning or boiling, or else fed to pigs. If the apples are given to pigs, it is essential that they be fed as soon as gathered, for if they are stored they soon become a hatchery for the moths. It is also payable to have all infected apples picked at least once or twice during the season and treated as suggested above.

Poles and props used in the orchard should be kept free from bark and examined for codlings.

Bandaging is an important aid to spraying in the control of the moth. On unsprayed trees, an average of 208 codling grubs were

removed from each tree during last season. In bandaging, the following points need special attention:—

(1) Scraping the trees; all rough bark must be thoroughly removed, otherwise half the efficacy of the band is lost.

(2) The material used must be of a fairly thick and close character. Strips from a wool bale are perhaps the best, whilst bran bags are practically useless on account of the openness of the weave.

(3) Bands should be examined every week, otherwise they form ideal breeding grounds for codlings, and unless this condition is complied with, it is much better to have no bandages at all.

A Good Type of Bandage fixed with a Single Nail.

When these conditions are carefully carried out, it will be found that bandaging is an exceedingly useful adjunct to spraying. The cost is not excessive. If the bandages are cut from old wool packs they will cost less than 1d. each for material and labour in cutting them, while a man will bandage about 400 trees in a day.

In spraying for the first brood there are two essentials—first, a calyx spray when the blossoms have fallen from the majority of the blossoms. For the sake of thoroughness it is advisable to apply two

calyx sprays, a week apart, to make sure of catching all blossoms. Second, a thorough cover spray when the moths are emerging. The time for this should be determined by individual growers either by the use of bait traps containing fermenting apple juice or by watching the emergence of moths from breeding cages placed on the north side of trees in the orchard. These two sprays should be of arsenate of lead, used at the rate of 5 lb. of paste, or 2½ lb. of powder in 80 gallons of water. Three subsequent sprays will be found necessary, and, from the experiments at Harcourt, there seems little doubt that the application of white spraying oil emulsion at a strength of 2½ per cent. may be used in place of arsenical sprays, as giving better control and leaving less residual arsenic on the fruit.

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(*e*) Regan, W. S.—Values of Moth Control Sprays Tested. *Better Fruit,* XXI. No. 8.

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WINTER EGG-LAYING TEST.

(From 1st April to 31st July, 1929, for Hens, and 1st May to 31st July, 1929, for Ducks.)

By W. C. Rugg, Chief Poultry Expert.

The Winter Test at the nineteenth Victorian Egg-Laying Competition for Hens, conducted at the Burnley School of Primary Agriculture and Horticulture, commenced on the 1st April, and was concluded on the 31st July—a period of 122 days.

This year the system of allotting the awards at the Burnley Competitions has been altered. Last year prizes and certificates were awarded to the birds laying eggs of the greatest market value. This year, however, the winners are to be decided on the greatest number of first-grade eggs laid. This change has been made as a step towards bringing about uniform regulations governing Government competitions in all the States. It was found to be almost impossible to arrive at any system of money values that would be fair in comparing the values of eggs in the several States, owing to the fact that prices are subject to such great variations.

Perhaps a further improvement on the present system would be to allot points for each first-grade egg laid during different periods, a greater number of points to be allowed for eggs laid during the winter and a lesser number for those laid in the spring and summer months. It has been suggested that the competition period of 48 weeks be divided into three periods of 112 days each, and that five points be allotted for every first-grade egg laid during the first 112-day period (a time when owing to low production high prices rule); for the second 112-day period (a time of high production and low prices) three points might be allotted; and during the last 112 days, a time when production is falling off, and consequently prices are increasing, it is suggested that four points should be allowed. Taking the average prices during these periods over the last three years, it is thought that this method of awarding points would be reasonably fair.

If some such system were adopted for all Government-controlled competitions, it would be possible to compare the value of the winning hens in the various States, and so set up an Australian standard.

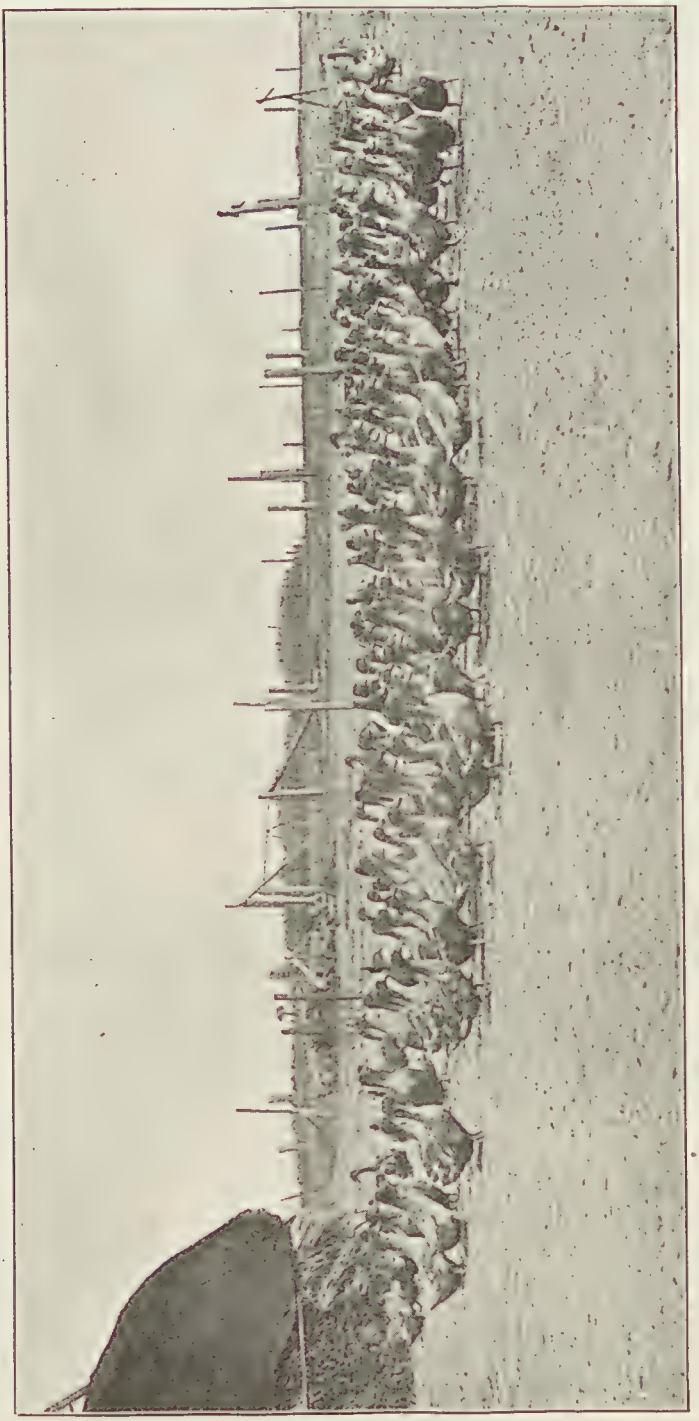
Proofs and Signs of Improvement.

The steady improvement in the quality of the birds sent into the competitions during the last few years has been well maintained this year, and is reflected in the sizes of the eggs being laid. A fair number of birds laid 2-oz. eggs during the first week of the competition, and there is every prospect that at the end of the competition the average weight of eggs laid will show an improvement on last year. This, I mention with, I hope, pardonable pride, for it is generally admitted that the great improvement in the size of eggs now laid in this State, as compared with a few years ago, is largely due to the influence of the Burnley competitions. The weighing of each individual egg and the publishing of the number of first, second, and third-grade eggs laid by each competitor has had a beneficial effect.

It is gratifying to be able to record a steady gain each year, not only in the increased number of first-grade eggs laid, but also the remarkable decrease in the number of under-weight eggs laid.

I stated three years ago that the Victorian poultrymen had turned the corner so far as the production of small eggs was concerned, and the following table shows the improvement since then:—

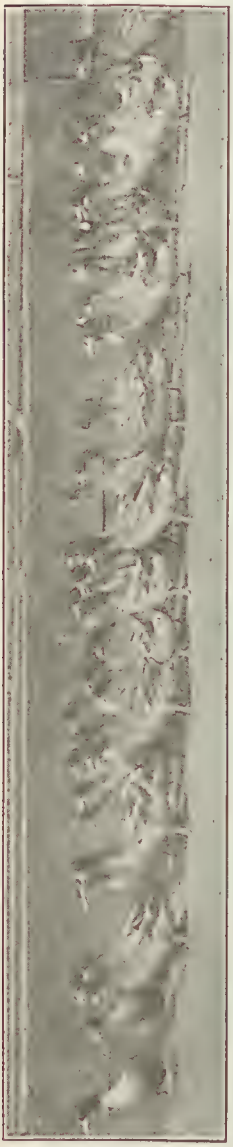
—	1925–26, 52 Weeks.	1926–27, 48 Weeks.	1927–28, 48 Weeks.	1928–29, 48 Weeks.
First grade	89,547	100,618	95,105	115,257
Second grade	21,144	14,816	11,295	11,182
Underweight	1,549	1,541	1,238	549
Total	112,240	116,975	107,638	126,988
Average per bird	206·3	202·3	197·86	199
Percentage of first grade eggs	80%	86%	88%	91%



A Flock of Khaki Campbell Ducks on Mr. M. G. Leech's Farm at Campbellfield.

Thus the increase in four years of the number of first-grade eggs was 11 per cent.

Although the number of birds entered for the Burnley competitions is limited, the results can be taken as a reliable indication of what is taking place throughout Victoria, for entries come from all parts of the State, and the owners consist of both experienced and inexperienced poultrymen.



Stud Drakes (Khaki Campbell) at Mr. M. G. Leech's Trevallyn Poultry Farm, Campbellfield.

Comments on Winter Test.

SECTION A.

The winning team in the Light Breeds section was one of White Leghorns, bred and owned by Mr. H. W. Devlin. This team laid a total of 457 first-grade eggs, an average of 76⅛ per bird, during the 122 days of the test.

Mr. T. L. Eastaugh's pen secured second place with 368 first-grade eggs.

Both of these teams were fed on wet mash.

The winning team in the Heavy Breeds section is owned by Mr. J. A. Smith, and laid 524 first-grade eggs, an average of 87⅓ per bird. The second prize certificate was won by Mr. C. E. Graham, whose team laid 507 first-grade eggs.

The certificates for highest individual scores in the Light Breed section were won by Mr. Devlin; No. 1 bird in his team laid 99 first-grade eggs, and No. 5 bird in the same team laid 95 first-grade eggs.

The first prize certificate for highest individual scores in the Heavy Breeds section was won by Miss A. M. Gray. No. 4 bird in her team laid 101 first-grade eggs. Taking into consideration the very cold weather and the number of severe frosts, the performance of this bird ranks with any previous Burnley record. It is all the more creditable because the bird was with its team mates exposed to all the severe weather in an open yard.

The second prize certificate was won by Mr. J. A. Smith. No. 1 bird in his team laid 99 first-grade eggs—a very fine performance.

SECTION B.

The first prize certificate for Light Breeds was won by Mr. T. L. Eastaugh with a White Leghorn, No. 27, which laid 106 eggs. The second certificate was won by Mr. D. A. Dimmick; his bird, No. 21,

laid 93 eggs. Both of these pullets laid first-grade eggs from the very commencement of the test.

The first prize certificate for Heavy Breeds was won by Mr. E. White; his pullet laid 99 first-grade eggs. The second prize goes to the Wingood Poultry Yard for a pullet which laid 98 first-grade eggs.

All the birds which were awarded certificates during the Winter Test were fed on wet mash.

DUCKS.

Owing to an unavoidable delay in some repairs to the pens, the second Victorian Duck Egg-Laying Competition did not commence until 1st May. Thus the Winter Test, which concluded on the 31st July, was for 92 days.

Section A.

The first prize certificate was won by a team of six Khaki Campbell ducks, owned by Broadleigh Egg Farm, with a score of 507 first-grade eggs, an average of 84½ per duck for 92 days. This is a very even team of good quality and remarkably even in the production of eggs. The second prize certificate was awarded to a team of Fawn and White Runners owned by Mr. R. Isworth; this team's total was 436.

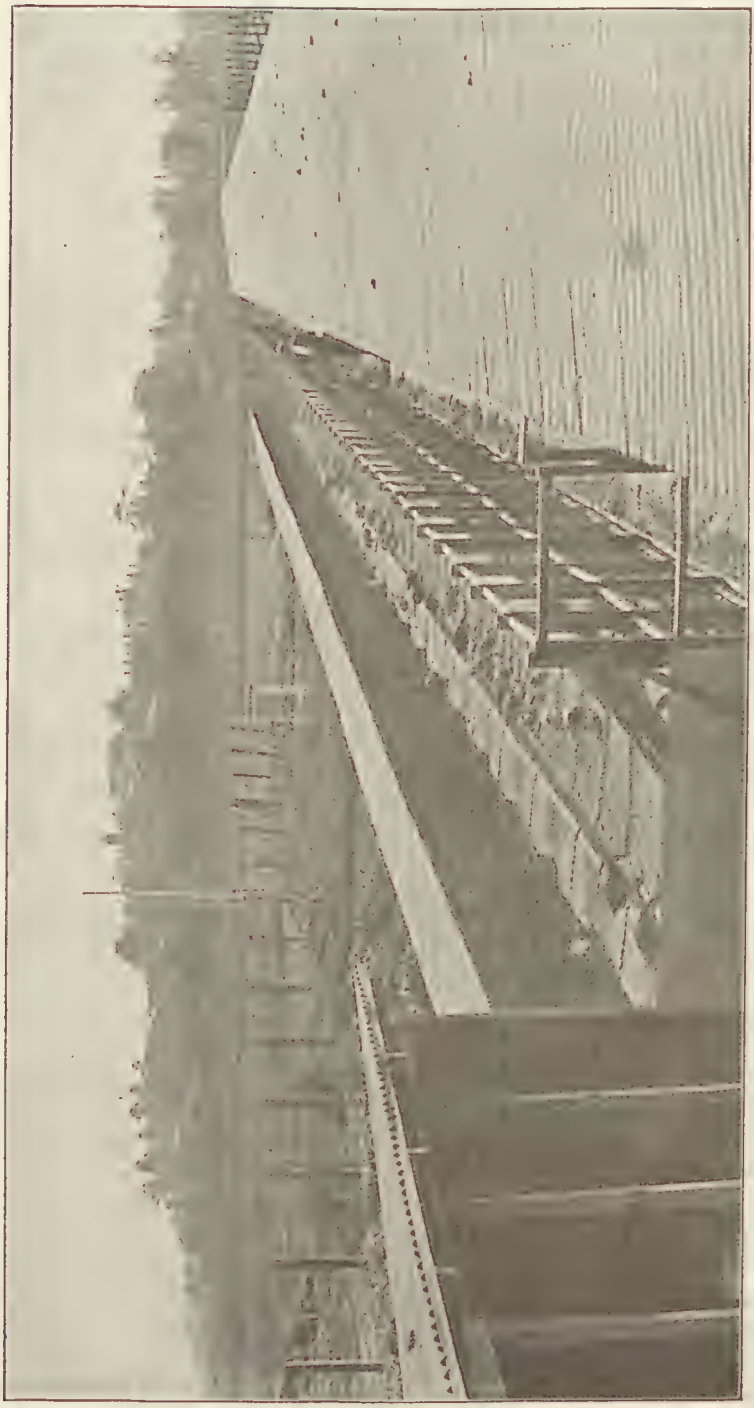
The certificates for the highest individual score in this section was won by a Khaki Campbell duck owned by the Orana Poultry Farm; the total number of first-grade eggs laid by this duck during the 92 days of the test was 90. The second prize certificate was won by No. 5 duck (a Khaki Campbell) in the team owned by the Broadleigh Egg Farm; her score was 89 eggs laid in 92 days.

Section B.

The first prize was won by a trio owned by Mr. M. G. Leech, with a score of 262 first-grade eggs, an average of 87⅓ in 92 days, which is equal to the best average of the hens in this competition in 122 days, and is certainly a fine performance.

The second prize certificate was won by a trio of White Runners owned by Mr. J. Hayes; their score was 228 first-grade eggs.

The certificates for the highest individual scores were won by Mr. Leech's No. 1 duck with a score of 89 eggs, and his No. 2 with Mr. E. Clarke's No. 1, each laying 88 eggs. All these three birds were of the Khaki Campbell breed.



View of the Duck Pens at the Burnley Egg-laying Competition.

DETAILS OF RESULTS.

Hens.

Name and Address of Competitor.	Pen No.	Bird No.	Underweight Eggs.	Total First Grade Eggs.	Breed.
SECTION A.—GROUPS OF SIX BIRDS—TRAPNESTED.					
SIX BIRDS.—LIGHT BREEDS.					
1st Prize.—Champion Certificate.					
H. W. Devlin, 100 Dendy-street, Middle Brighton, S. 5	8	..	18	457	White Leghorns
2nd Prize.—Government Certificate.					
T. L. Eastaugh, Nepean-road, Highett, S. 21	10	..	42	368	White Leghorns
INDIVIDUAL BIRDS.—LIGHT BREEDS.					
1st Prize.—Champion Certificate.					
H. W. Devlin, 100 Dendy-street, Middle Brighton, S. 5	8	1	..	99	White Leghorn
2nd Prize.—Government Certificate.					
H. W. Devlin, 100 Dendy-street, Middle Brighton, S. 5	8	5	..	95	White Leghorn
SIX BIRDS.—HEAVY BREEDS.					
1st Prize.—Champion Certificate.					
J. A. Smith, 114 Arthur-street, Fairfield, N. 20	59	..	13	524	Black Orpingtons
2nd Prize.—Government Certificate.					
C. E. Graham, Portarlington	50	..	25	507	Black Orpingtons
INDIVIDUAL BIRDS.—HEAVY BREEDS.					
1st Prize.—Champion Certificate.					
Miss A. M. Gray, "Wilcot," Boronia-road, Bayswater	49	4	8	101	Black Orpington
2nd Prize.—Government Certificate.					
J. A. Smith, 114 Arthur-street, Fairfield, N. 20	59	1	..	99	Black Orpington
2nd Prize.—Government Certificate.					
T. L. Eastaugh, Nepean-road, Highett, S. 21	47	6	1	99	Black Orpington
SECTION B.—INDIVIDUAL BIRDS—SINGLE TEST.					
LIGHT BREEDS.					
1st Prize.—Champion Certificate.					
T. L. Eastaugh, Nepean-road, Highett, S. 21	27	..	..	106	White Leghorn
2nd Prize.—Government Certificate.					
D. A. Dimmick, Craigiedale, Rye ..	21	..	..	93	White Leghorn

Hens—*continued.*

Name and Address of Competitor.	Pen No.	Bird No.	Underweight Eggs.	Total First Grade Eggs.	Breed.
SECTION B.—INDIVIDUAL BIRDS—*continued.*					
HEAVY BREEDS.					
1st Prize.—Champion Certificate.					
E. White, 85 Miller-street, North Fitzroy, N. 7	164	..	3	99	Black Orpington
2nd Prize.—Government Certificate.					
Wingood Poultry Yard (T. A. Goodwin), 8 Peel-street, Kew, E. 4	169	..	3	98	Black Orpington

Ducks.

Name and Address of Competitor.	Pen No.	Bird No.	Underweight Eggs.	Total First Grade Eggs.	Breed.
SECTION A.					
TEAM OF SIX BIRDS.					
1st Prize.—Champion Certificate.					
Broadleigh Egg Farm (L. G. Broadbent), 32 Shepparson-avenue, Carnegie, S.E. 9	13–18	..	4	507	Khaki Campbell
2nd Prize.—Government Certificate.					
R. Isworth, 14 Union-street, Preston, N. 18	7–12	..	..	436	Fawn and White Indian Runner
INDIVIDUAL BIRDS.					
1st Prize.—Champion Certificate.					
Orana Poultry Farm (G. Crawford), Mitcham	..	29	..	90	Khaki Campbell
2nd Prize.—Government Certificate.					
Broadleigh Egg Farm (L. G. Broadbent), 32 Shepparson-avenue, Carnegie, S.E. 9	..	17	1	89	Khaki Campbell
SECTION B.					
TEAM OF THREE BIRDS.					
1st Prize.—Champion Certificate.					
M. G. Leech, Trevallyn Poultry Farm, Sydney-road, Campbellfield	49–51	..	..	262	Khaki Campbell
2nd Prize.—Government Certificate.					
J. Hayes, cr. Herald and Bernard streets, Cheltenham, S. 22	40–42	..	1	228	White Indian Runner
INDIVIDUAL BIRDS.					
1st Prize.—Champion Certificate.					
M. G. Leech, Trevallyn Poultry Farm, Sydney-road, Campbellfield	..	49	..	89	Khaki Campbell
2nd Prize.—Government Certificate.					
M. G. Leech, Trevallyn Poultry Farm, Sydney-road, Campbellfield	..	50	..	88	Khaki Campbell
2nd Prize.—Government Certificate.					
E. Clarke, Three Chain-road, Mornington	..	37	..	88	Khaki Campbell

SUMMER FODDER CROPS.

(An address by P. Ryan, B.Ag.Sc., Inspector of Agriculture.)

In recent years increased attention has been paid to the growing of summer fodder crops, but these do not yet occupy the place in Victorian agriculture that their value warrants. There is no doubt that the carrying capacity of much of the land in the moister parts of the State could be increased if farmers were to take more advantage of these crops to supplement their pastures.

The traditional policy of most farmers in Victoria has been to rely solely on pastures to supply the needs of live stock, with the result that, when a dry season occurs, serious losses in our flocks and herds follow. By growing summer fodder crops and conserving portion of the fodder grown in the form of silage, provision can be made to meet this contingency and reduce the losses. Apart from their value in providing reserve fodder, these crops serve another important purpose in supplying succulence to the ration when the grass has dried up. Succulent feed is particularly necessary where the secretion of milk is involved, as in the case of dairy cattle and breeding ewes; and there are very few districts where the pastures can be relied on to provide this succulence throughout the year. Where reliance is placed solely on the pastures the milk production drops as soon as the grass begins to dry off although there may be ample dry feed. If summer crops are grown, they are ready for feeding at this stage and, in combination with the dry grass, will provide a ration sufficiently succulent to maintain milk production and keep the animals in good health.

The value of green crops is much greater than would appear from their chemical analyses. The natural juices in the plant have an invigorating effect upon the digestive system of the animal, and enable it to make better use of the food consumed. Their cooling and slightly laxative action keeps the animals in good health, and removes the danger of digestive diseases such as impaction, which are brought about by prolonged feeding on dry material. Further, these juicy feeds are highly palatable and whet the appetite, so that the animal is able to consume a larger quantity of roughage, and thus have a larger store of nutriment to draw upon for the production of milk.

The requirements of a fodder crop are that it should be cheaply produced, easily handled, and that it should provide a large bulk of palatable and nutritious feed. Among the summer-growing crops which fulfil these conditions are lucerne, maize, millet, Sudan grass, sorghums, and rape.

Lucerne.

Although lucerne is looked on generally as the "King of fodder crops," I do not intend to deal with it in detail, as its cultivation has already been fully discussed in addresses and articles by the Senior Irrigation Officer (Mr. L. C. Bartels). I would like to emphasize, however, that, apart from the irrigation districts, there are many parts where lucerne can be successfully grown under the natural rainfall. Even where the summer rainfall is not heavy enough to give sufficient growth for hay-making, useful grazing will be provided.

Where irrigation is not available, autumn sowing is generally preferable, as the winter rains enable the young plants to become established before the hot weather sets in. To secure a good germination, the preliminary operations would leave the seed bed firm, finely divided, and free from weeds. The seed should be sown shallowly on a warm moist bed. From 10 to 12 lb. of seed per acre will be required, and this may be sown through the grass seeder attachment, or by mixing with superphosphate and sowing through the manure box. Seed and manure should be mixed just before sowing. The tubes of the drill should be taken off, and the seed and manure allowed to drop from the drill on to the ground. It should then be lightly covered either by brush or other light harrows. The Hunter River variety has given the best results under Victorian conditions. During the first season, stock should not be allowed to graze on the stand. Cutting through the first summer is recommended.

During the following July and August sheep should be employed to graze off the winter growth and clean up the weeds. If only a few sheep are placed on a large area, the grazing will not be complete and the stand will deteriorate. If the area of lucerne is large, it is much better to erect temporary fences and crowd the sheep on to small areas. Experiments have shown that top dressing with 1 cwt. of superphosphate per acre each year, or 2 cwt. per acre every alternate year, is very profitable.

Maize is one of the most valuable of summer-fodder crops, giving, under favorable circumstances, large yields of nutritious and palatable fodder. It is not suitable for early feed, but will provide a plentiful mid-seasonal and late supply. Further, it is admirably suited for silage making. It should be sown in the spring, when the danger of frosts has passed and the ground is warm enough to give a good germination. Except on very hilly country, sowing in rows is recommended in preference to broadcasting. When sown in rows, intercultivation may be practised to keep down weeds and conserve moisture. The rows can be spaced from 18 to 36 inches apart, depending on the fertility of the soil and the rainfall. The seed should be planted from 9 to 12 inches apart in the row. Suitable varieties are Hickory King and Flat Red. If earlier crops are desired, some of the Flint varieties, such as Longfellow and Ninety Day, may be used.

The crop is best handled by cutting and chaffing before being fed to cattle, as if stock are turned in on it much waste ensues. The cattle will often nip the stalk off half way down the plant, and, after chewing a portion, will drop the balance on the ground, where it is trodden into the dirt and wasted. Sheep, however, can be grazed on maize without great loss; the right time to turn them in is when the maize is in flower and the cob just forming. Only sound-mouthed sheep should be placed on the crop.

Millets.

The millets, of which Japanese is the most useful variety, are particularly valuable for providing early grazing. Japanese millet makes rapid growth, and usually is ready for feeding off six weeks after seeding. The crop should be grazed when it is about 6 inches high, and on no account should it be allowed to get higher than 12 inches, as

beyond this stage the nutritive value decreases. When fed off while it is from 6 to 9 inches high, Japanese millet is an excellent milk producer, and is probably the most valuable summer crop for the dairy farm.

Millet may be sown either broadcast or may be drilled in rows 7 inches apart. If the crop be drilled in, from 9 to 12 lb. of seed per acre will be required; if broadcast, about 20 lb. will be necessary. The seed should be sown shallowly on a warm, moist, and firm seed bed. If planted too deeply, a poor germination will result. Many of the failures reported in the germination of the seed are due to this cause. On the other hand, if the seed be sown on the dry surface of loose open soils, failures may follow unless an opportune shower is received. On such soils special care has to be taken to produce a consolidated seed bed, and the use of the roller before seeding is advisable to bring the moisture to the top.

Sudan Grass.

Sudan grass, because of its power to resist drought, is particularly valuable in districts where the summer rainfall is limited or uncertain. It is a rapid grower, shoots freely, and provides a great bulk of succulent feed which is palatable to all classes of stock. The remarks made about the preparation of the land for millets apply also to Sudan grass.

In districts with a fair summer rainfall Sudan grass should be sown in rows 7 inches apart at the rate of from 12 to 15 lb., while in drier districts it can be sown in drills at the rate of 6 lb. per acre.

Care Required with Sorghum to Avoid Poisoning.

While Sudan grass belongs to the sorghum family, there is much less danger of prussic-acid poisoning in pasturing it than is the case with the other sorghums. Indeed, provided that the seed sown is pure, and due caution is exercised, there is very little danger in grazing at any stage of growth unless the crop has suffered a severe check by frost or drought. Sudan grass readily crosses with other sorghums, and the plants resulting from the cross seem to take on the poisonous properties of the sorghums. The case of cattle poisoning reported from Wellington, New South Wales, a few years ago, was investigated by the Agrostologist of that State, who considered it to be due to this cause. Growers should also be careful that the Sudan grass seed does not contain seeds of Johnson grass. The seeds are somewhat similar, but those of Johnson grass are redder and smaller than those of Sudan grass. Johnson grass, because of its perennial root-stocks and the consequent difficulty of eradicating it, has become a pest in many parts.

Of the other sorghums, those most commonly grown in Victoria are Early Amber cane for an early crop, and Imphee and Saccaline for late crops. These are valuable summer crops, but in districts in which maize can be grown their sphere of usefulness is restricted. Their value lies in the fact that they are hardier than maize and will stand adverse conditions of soil and climate better than that crop. The seed should be sown in rows 3 feet apart at the rate of from 10 to 12 lb. per acre. In connexion with the pasturing of sorghums, it is

important to bear in mind that the plants contain prussic acid in the early stages of their growth, particularly if they have been stunted by frost or drought. The quantity of poisonous substance gradually diminishes as the plant reaches maturity, and entirely disappears when the seed is formed.

Avoiding Danger of Hoven or Bloat.

There are several points that will bear emphasizing in regard to the feeding off of fodder crops. There is always danger of hoven or bloat if hungry stock are turned in on a green crop, particularly early in the morning when it is wet with rain or dew. Stock become accustomed to a food, and the first occasion on which they are placed on some new crop is likely to be most dangerous. Consequently, for the first day they should not be allowed to remain on the crop for any length of time. The danger may also be minimized by giving the animals access to dry food before they are turned on the crops.

Subdivided paddocks allow of far greater carrying capacity than with one large field. The change from one paddock to another in which there is fresh untrampled feed acts as a stimulant to stock to eat more, and also allows the previously-grazed paddock to make fresh growth.

Conclusion.

In conclusion, I would stress the importance of thorough cultivation and liberal manuring if the best results are to be secured. A fine firm seed bed overlying a moist subsoil is required, and this can be secured only by early ploughing and judicious cultivation.

THE SHEEP BLOWFLY.

By the Veterinary Staff, Department of Agriculture.

At the present time this pest is causing very serious losses to the sheep and wool industry throughout the world. It is a most serious question for Australia, for wool ranks as one of our greatest assets. The fly is increasing every year at a rapid rate and has become a considerable menace to the industry. Further, if a very vigorous campaign is not carried out against it a considerable drop in the value of the wool clip must occur.

As the number of sheep has increased the flies have multiplied, and at the same time they have changed in their habits. Formerly the blowflies were useful scavengers, and used to deposit their eggs on dead animal matter, but they now lay them on the wool of living sheep, and they will even "blow" new woollen blankets.

It is a very difficult matter to evolve any treatment that will either prove repellant to the fly and thus stop its attack, or that will rid the sheep of the maggots, without causing injury to the animal.

The natural breeding grounds for the flies are decaying carcasses of animals. Owing to the losses of stock in drought periods, and also deaths due to disease, accident, and old age, there is unfortunately no scarcity of these. The majority of these carcasses are not buried, but rot away on the surface of the soil, providing ideal conditions under which the flies can multiply.

Varieties and Life History.

Several different species of the flies have been identified, and their life history studied. Although all of them go through the same stages during their life cycle, a marked variation is shown in the time required for its completion. Not only is the life cycle of some varieties longer than that of others, but that of the same species will differ from year to year, depending on seasonal conditions.

Generally speaking, the life cycle is as follows:—The adult fly deposits its eggs, which hatch out in from a few minutes to 21 hours. The larva or maggot after emerging from the egg is very active, and for four or five days it feeds on either carrion or living flesh. When this stage is complete the larva loses its activity and seeks a suitable position in which to pupate. This position may be under a carcass, or the maggot may even burrow under the surface of the soil. The pre-pupal stage may last from one and a half to ten days. When this is complete the pupal stage is entered upon, and this lasts for from five to fifteen days in summer up to three months in winter. The adult fly then emerges, and the life cycle is complete. There are several varieties of blowflies, but the following are the most commonly met with:—

1. Metallic Blue Blowfly (*Chrysomia Albiceps*).
2. Green Lucilia Blowfly (*Lucilia Sericata*).
3. Smaller Green Blowfly (*Microcalliphora Varipes*).
4. Larger Yellow Blowfly (*Calliphora Stygia*).
5. Smaller Yellow Blowfly (*Calliphora Augur*).

The flies are found all over Australia, but the numbers of the different species vary considerably according to the season of the year, the altitude, rainfall, and temperature. Both the green varieties of blowfly predominate during the spring months, while the larger yellow blowfly is most numerous in winter, and almost disappears in summer. The Green Lucilia blowfly is considered the worst variety here, and in a series of experiments carried out in South Africa it also proved to be the most prolific. The life of the adult varies from about a week to a month, and as they will travel up to nearly a mile per day a tremendous amount of country may be covered from the starting point where they hatched out. Owing to the number of eggs deposited by a female fly (up to 300) very active measures must be adopted to cope with the pest.

Method of Attack.

Fly strike will only take effect on a moist surface, because the young maggots quickly die if kept from moisture, consequently wounds from shears and lamb-marking or crow picks are most likely spots for the fly to attack. These are cases that can be readily seen, and proper antiseptic treatment quickly gets rid of the trouble. The most serious aspect of the case is when the fly strikes the wool without any wounds being present. This occurs most frequently in those regions which become stained by dung and urine. Rams are often struck near the base of the horns where the skin may have become abraded from fighting. Lambs may be struck about the head and neck, for these parts are liable to become soiled as the young suck their mothers. Ewes, when lambing, often get the fleece soiled, and require careful observation. Damp wool attracts the flies; therefore close-woolled wrinkly sheep, whose fleeces will contain moisture for long periods are more liable to attack than are long-woolled breeds, whose fleeces are not so dense, and therefore dry more rapidly. Diarrhœa or scouring from young grass or succulent food, or even heavily mineralized water, is another factor in soiling the wool.

When a sheep is struck the maggots work their way through the wool till they reach the skin, which they attack, inducing intense irritation and causing the sheep to bite at the affected part. This will attract attention to the animal, which may separate itself from the flock, cease feeding, and show general uneasiness; when struck in the crutch it will probably stamp with either hind foot. The wool on the affected area appears dirty and blackish in colour, and if bitten by the sheep will be ragged. On examination a blackish discharge will be found soaking through the wool, and as this has a very foul odour it invites further attacks from the flies. As the maggots grow they spread and damage the tissues further, so that the wool comes away, leaving a raw surface. If not treated the infestation will spread, the sheep gradually wastes away; gangrene sets in, and is followed by the death of the animal.

Control.

There are two ways by which the attack of the sheep blowfly may be controlled, namely—(1) Prevention ; and (2) treatment. Prevention must be the aim of the sheep breeder and scientist, as the discovery of an effective method will eliminate the need for treatment. Prevention must be sought either along lines which lead to the destruction of the flies or the maggots, thus preventing the completion of the life cycle, or by some means which will render the sheep immune from the attacks of the fly.

Destruction of Flies.

The most important and effective method is the destruction of their breeding grounds, which are dead carcasses and offal. This is most readily effected by means of burning, but this is often impracticable

owing to scarcity of firewood, especially on the plains, and also to the risk of grass fires in the heat of summer. The latter risk may be lessened by the use of a portable incinerator which will also need less wood than burning carcasses in the open. If large numbers of carcasses have to be burnt in drought periods, the best method is to dig a narrow deep trench with sloping ends in the form of a cross, fill it with wood and lay the carcasses on top, when they may be readily burnt. The trench should be dug out out in the open in as exposed a spot as possible, so that any wind that may be blowing will assist in the complete destruction of the carcasses.

If burning the carcass is out of the question, it should be opened up; this may lead to its being consumed by birds and animals ; or if not eaten, then it will dry more quickly in the sun. If the carcasses are buried they should have at least 3 feet of well rammed earth over them, otherwise the flies, when they develop, will make their way to the surface.

Poisoning the flies and maggots by spraying the carcasses of dead animals with a poisonous solution has been successfully and extensively used, both in South Africa and Australia, but great care has to be taken to prevent animals and birds gaining access to the poison bait, and it also entails a considerable amount of labour, as it is better to spray the baits lightly for several days, rather than to soak them in a large quantity of the poison in the first instance. Arsenite of soda is found to be the most suitable preparation to use, as it may be readily dissolved in water. To prepare the solution, place 2 oz. of arsenite of soda in a kerosene tin (4 gallons) full of water, and stir till completely dissolved. The best way to use it is to dig a narrow hole about 2 ft. 6 in. deep, open a dead sheep along the belly and take out the internal organs; put these into the hole, and then put the carcass, belly upwards, on top of them, keeping the cut edges apart with a piece of stick, about 1 foot in length. Spray the carcass and viscera with the solution and pour about a pint of it into the body cavity. This will keep the carcass moist for a longer period. Cover the hole completely with wire-netting tightly pegged down; this will serve to keep animals out, and yet give free access to flies. The carcass should be sprayed with poison daily until it becomes hard and dry, when the hole should be filled in.

Another useful method is to put some meat into a tin containing arsenic solution, and this can be moved about from one place to another wherever the blowflies congregate.

Trapping the flies has been found a very successful means of helping to keep the pest in check, and is largely used both in Australia and South Africa.

Many different types of fly-traps have been invented since the blowfly became such a serious pest. Trap No. 1, illustrated on page 557, has been tested by the New South Wales Department of Agriculture, and has proved its worth. The illustrations of Trap No. 2, together with the directions for making it, are reproduced from the *Journal of the Department of Agriculture,* Union of South Africa.

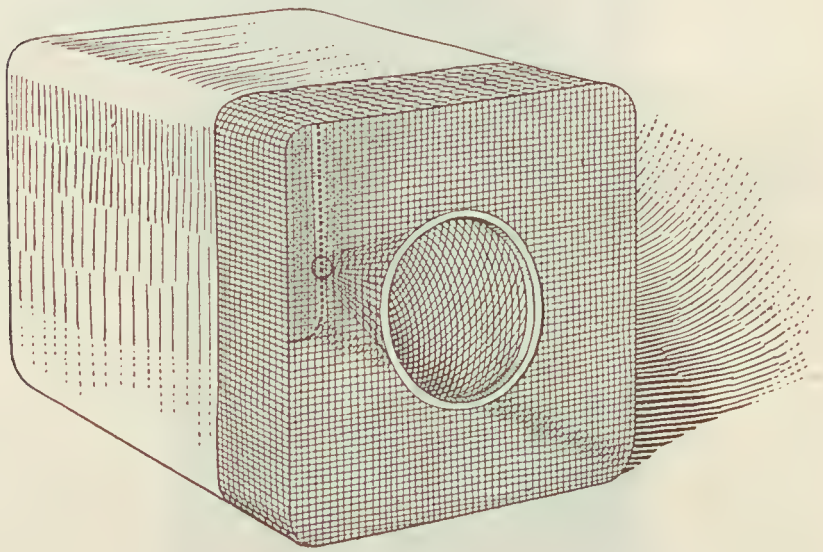
Trap No. 1.

The Method of Making.

Any handy man can make a trap, similar to that illustrated above, out of a petrol tin and some wire gauze. Remove the end of the tin, cover the opening with wire gauze, which should overlap the sides about 2 inches. Let into the wire-gauze covering a funnel 4 inches across and 4 inches in depth, with an opening at the apex about the size of a three-penny piece. Paint the inside of the tin white; if the outside also be painted, the trap will last longer.

How to Use Trap No. 1.

When the trap has been made, stand it upright and pour in about two quarts of water. Then drop in 1 lb. of meat, or half a freshly-skinned rabbit. Place the wire gauze over the rim of the tin, and firmly press down so that the funnel or cone will point downwards. In summer, fresh water should be poured through the top of the trap every week, and every second week about ½ lb. of meat should be added to the fermenting mass.



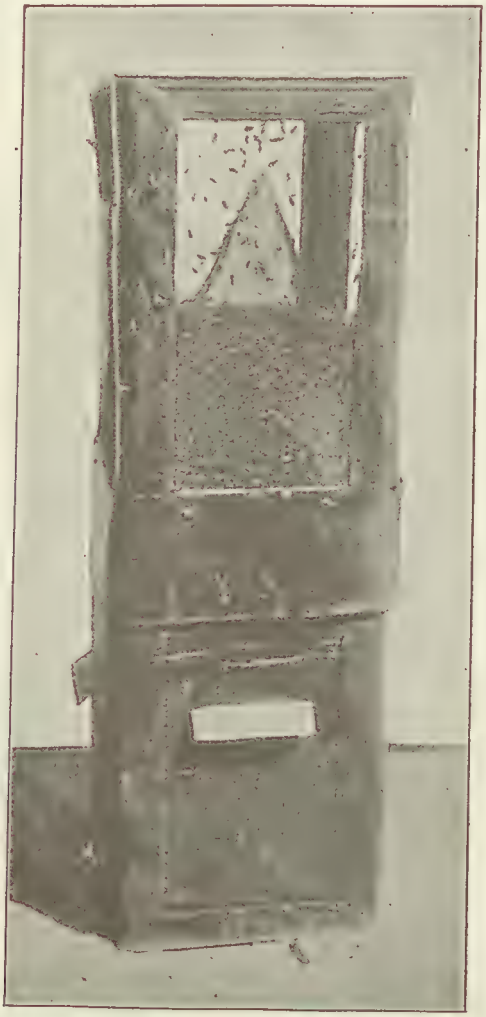
Trap No. 1.

Before removing the gauze top, the flies clinging to the under surface should be destroyed with a flare or a torch.

The efficacy of these traps is shown by the fact that, at Warrah, New South Wales, several were set out on 1st October, 1919; they were visited at regular intervals, and the bait renewed, but were not cleaned out until the new year. At a conservative estimate, each trap accounted for a "catch" of 100,000 flies for the three months. It may be reckoned that half of these were females. When it is remembered that each female blow-fly is capable of laying 100 eggs, there seems little room for argument as to the value of a trap as a means of control.

Trap No. 2.

The trap consists of two petrol tins placed one above the other and held in position by a strip of sheet metal. The upper tin is the trap proper, and contains a wire-gauze cone or pyramid fastened in an upright



Trap No. 2 Half full of Sheep Blow-flies.
Note the position of the cone and the support of the wooden wedge holding the lid in place.

position, its apex being 3 inches from the top of the tin and its base secured on the inside of the bottom edge of the tin.

The first step in making the trap is to mark out the windows in the sides and top of the upper tin. Details of these apertures can best be

seen by reference to figure on this page and Figure 2 on page 561. They are made of such a size that there is a strip of tin 1 inch wide left all around them, except at their lower sides, where the strip is 2 inches

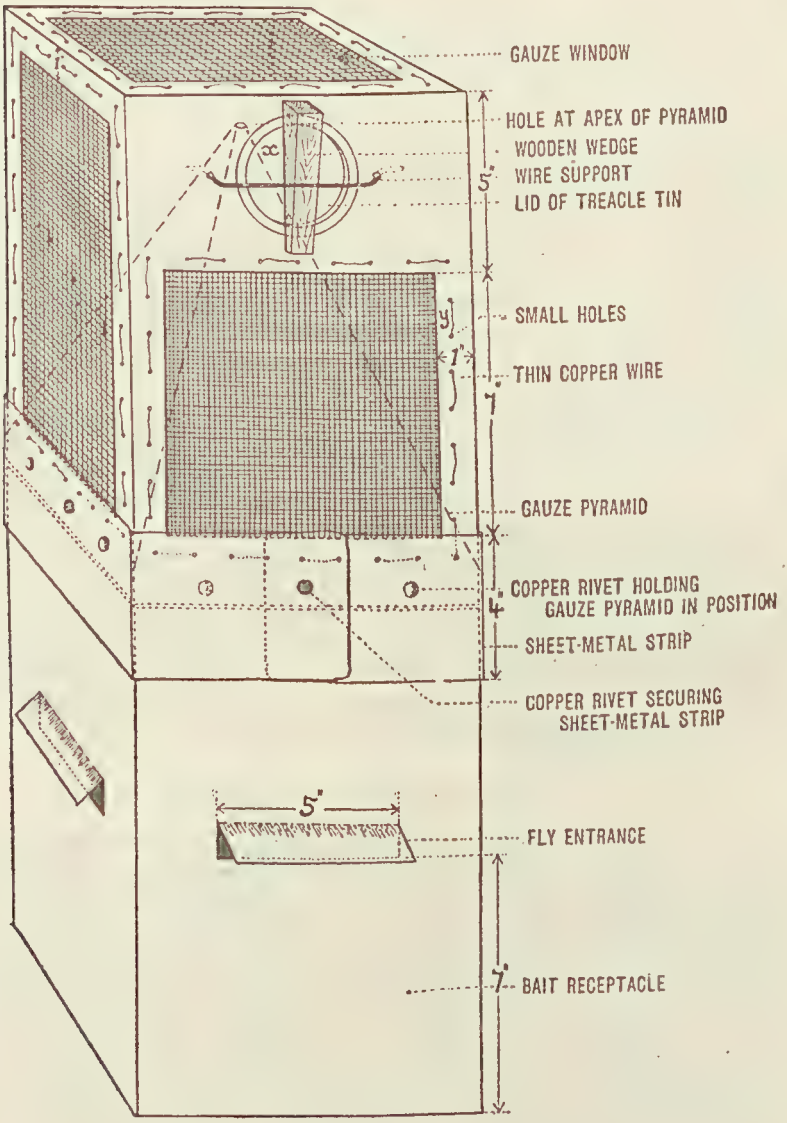


Figure 1.

wide. This leaves enough of the tin to give rigidity to the trap and enable the gauze to be fastened in place. Then mark out the hole "x" (Fig. 1) and the position of the cuts to be made in the bottom end of

the tin, as shown in Figure 3. The round hole "x" (Fig. 1) is for the purpose of emptying the trap of flies when it is in operation. The hole is cut to fit the lid of a treacle tin, which is used to close it. Place the lid of a treacle tin with its inside surface against the side of the upper tin where it is to be fitted and scratch around its inside edge with a nail. The window on the side in which this hole is to be made is made smaller than those on the other three sides of the tin, in order to leave plenty of room for making this hole. The upper edge of this window should be 5 inches from the top of the tin, and the upper edge of the hole "x" ½ inch from the top of the tin (Fig. 1).

Before cutting the apertures in the tin, small holes must be punched around the edges of the windows, using a thin nail and a hammer, and making the holes ½ an inch from the apertures, and 1 inch apart as at "y" (Fig. 1). These are for the purpose of sewing in the gauze windows, which is done with thin copper wire. The apertures are then cut with an old pair of scissors or a tin cutter. In cutting out the bottom end of the tin, a strip 1 inch wide is left all around the inside of its bottom edge. Slit this strip at the corners of the tin as at "a" (Fig. 3) leaving four flaps "b" as shown in the figure.

Two holes are punched with a stout nail, one at each side of the hole "x" (Fig. 1), and a stout piece of wire is bent through these over the hole, as shown in the figure. This piece of wire serves as a support for a wooden wedge which is used to keep the treacle-tin lid in place while the trap is in operation.

The gauze is next fastened into the windows. Pieces of good 12 or 14 mesh wire gauze, preferably galvanized, are cut to fit the openings so that there is an inch to spare on each side. They are fitted on the inside of the tin and sewn in place with thin No. 22 standard gauze, copper wire threaded through the holes "y" (Fig. 1). The square of gauze in the top of the trap should be sewn in first, then those in the sides, and finally the gauze cone is fastened in place.

The Construction of the Cone.

It is a common but mistaken idea that the cone of one of these traps is difficult to make. There is no difficulty if a little care is taken. It is best, however, to cut out a paper pattern of the cone, and when this is found to fit correctly, cut the gauze to coincide with it. The pyramid or cone has four sides to correspond to the sides of the trap, each side being a triangle with its base as long as the width of the trap, and its height nearly that of the height of the cone. The pattern is as shown in Figure 4, on which the measurements are given. First strike out the arc of a circle with centre A and radius of 12 inches. Then mark off the points B, C, D, E, and F along this arc so that they are 9¼ inches apart. Draw lines joining these points and to the point A, and proceed as shown in the figure. Strips of gauze 1 inch wide are left along the line AF and at BC, CD, DE, and EF (Fig. 4), in order to sew the cone into shape and to fasten it into the trap. The gauze when cut to shape is folded along the lines AC, AD, AE, and AF, so that the strip AF overlaps the edge AB, and these are then sewn together with copper wire, the same as

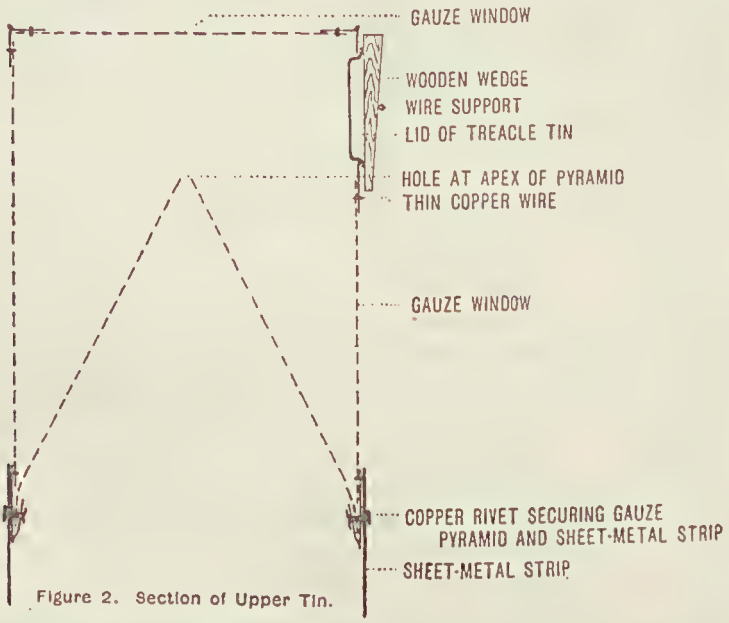


Figure 2. Section of Upper Tin.

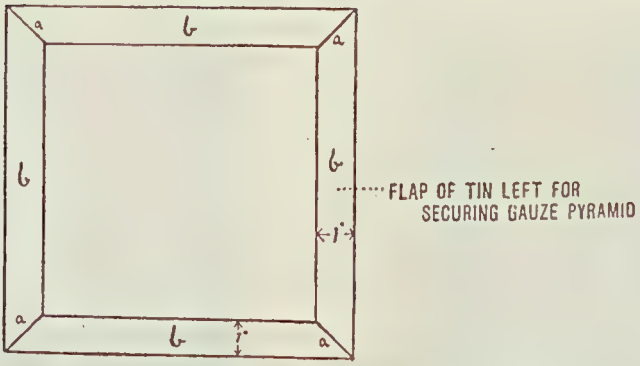


Figure 3. Bottom of Upper Tin.

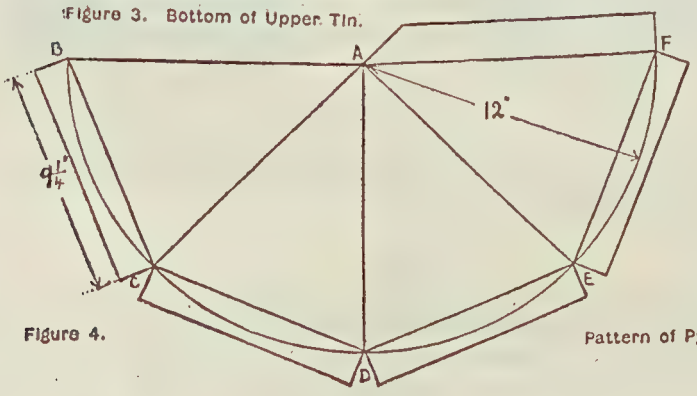


Figure 4. Pattern of Pyramid.

was used for sewing in the windows. The apex of the cone will then be closed. After the cone is riveted into the trap, a hole must be made in the top of it through which the flies are to enter. This is best done by pushing a thick pencil up through the tip of the pyramid; the gauze will part at this point, the thin wires bending aside, and leaving a round hole of the required size.

To fasten the cone into the trap, its base is fitted under the flaps "b" (Fig. 3), which were left on the inside edges of the bottom of the tin, and which are now bent inwards against its sides, and secured tightly over the strips of the cone. BC, CD, DE, and EF (Fig. 4). The flaps are secured with split copper rivets such as those used in harness making. These rivets are put through the sides of the tin, the strips at the base of the cone and the flaps. Two rivets through each flap are sufficient (see section of upper tin, Fig. 2).

In order to keep the upper tin in position on the lower tin, a strip of sheet metal or paraffin tin, 4 inches wide and 40 inches long, is riveted on the outside of the bottom edge of the upper tin. It is fastened so that it projects 2 inches below the edge, and over the upper edge of the lower tin. Split copper rivets are used to fasten it in place. It serves to strengthen the trap in addition to keeping the tins in position. The ends of this strip will overlap on one side of the trap, and one rivet should be put through both ends at this point. The upper tin or trap proper is now complete.

The lower tin or bait receptacle consists simply of a petrol tin of the same size as that used for the upper tin. Its top is cut open, and four slots are cut in its sides through which the flies, attracted by the bait, enter. These slots, one on each side of the trap, are formed by making a horizontal cut, 5 inches long, at a distance of 7 inches from the bottom of the tin on each side. At each end of these cuts are perpendicular cuts, 1 inch long, running up from them. The flaps so produced are bent outward, as shown in Figure 1. The object of these flaps is to prevent light from entering the slots, and so prevent the flies from being attracted out through them after entering. The flaps do not hinder the flies from entering, because the flies find their way to them by walking up the outside of the trap.

When completed, the trap, and particularly the inside of the lower tin, should be painted with good thick paint to prevent it from rusting. The gauze should not be painted, as this hinders light from shining through it.

It has often been suggested to use a larger tin for the trap proper fitting over a smaller tin as the bait receptacle. This has been tried, but it has been found better to use tins of the same size for both the upper and lower part of the trap, and to rely on the strip of sheet metal to keep them together.

Baits.

Numerous forms of bait have been recommended, and the bait to use depends largely on the kind of fly to be caught and on the materials that are available. Sheep blow-flies are very strongly attracted by decaying animal matter, in which they breed naturally. The faster it decays, and the greater its stench, the more attractive it becomes. Solid

meat like that cut from a dead cow or a horse remains attractive longer than entrails and odd scraps. Entrails, &c., are very good, however, and are easily obtainable on most farms. Rabbits are often used, and are a good bait.

The trap here described is very efficient for the destruction of house-flies. Any meat will attract large numbers of house-flies.

Cost.

The cost of the material required for making this trap would be approximately 5s.

In South Africa trapping the maggots is practised, and this may be done very simply.

A considerable amount of experimental work, in the infestation of flies with parasites, has been carried out, but up to the present time no very marked result has been noted. Several varieties of wasps and beetles have been tried, but the experiments will have to be carried out on a very large scale before any appreciable reduction in the number of flies will be noticed.

Treatment—Preventive and Curative.

As regards preventive methods the most effective are crutching, dipping, and either jetting or swabbing.

(*a*) Correct Way. (*b*) Incorrect Way.

Crutching Sheep.

The most successful way to prevent fly strike is by keeping the wool short on those parts that are most liable to become soiled by dung and urine, so that exposure to the air will dry the wool quickly. Shearing does this each season, and remains efficient for about six weeks, by which time the length of wool prevents quick drying. A modified form of shearing, namely crutching, has become the usual method of prevention. This consists of shearing the wool from about 2 inches above the tail to the point of the hocks down either side of the fork or crutch. To be successful this must be carried out over a sufficiently wide area as shown above.

The best time to crutch the sheep is just before lambing, so that the ewes will not become so soiled when the lamb is born.

Dipping is very useful for two reasons. One is that it gives immunity for about three or four weeks from fly attack, and also because it kills any maggots on a sheep that has already been blown. The dip used generally is one containing arsenic. It is not advisable to dip sheep that have suffered extensive injuries to the skin on account of the risk of arsenical poisoning through absorption.

Jetting and Swabbing.

Jetting is the application of a solution to the crutching area of a sheep by means of a high-pressure pump with a nozzle of about 3-32 inch in diameter. The solution used is generally arsenical, as in the dip, but of a strength four times that recommended by the manufacturer for ordinary dipping. If the sheep-owner prepares his own jetting fluid the arsenic may be dissolved by boiling in the water and adding sufficient washing soda to make a clear solution. Use 1 lb. of arsenic to 5 gallons of water and approximately ½ lb. of washing soda.

When the sheep are being jetted, the nozzle of the hose should not be held nearer to the sheep than 12 inches, and the pressure should not exceed 160 lb. to the square inch, otherwise there is considerable risk of cutting the skin, especially if the wool is short. The sheep should be treated in a race, and about a quart of the solution should be applied at a constant pressure, decreasing to 100 lb. if the wool is very short. It is always advisable to spray a few inches beyond the crutching area.

Swabbing is a means of applying a preventive or curative application of that portion to the crutch that does not readily lend itself to jetting. A small mop made of rags on the end of a stick is used, and the application may be poured on the sheep and spread with the mop, or the mop may be dipped into a tin containing the preparation, and then thoroughly rubbed over the affected area. The preparations used for swabbing are usually oily or soapy emulsions.

To gain any lasting degree of immunity from spraying solutions it will be necessary to discover some chemical preparation that will combine with the yolk of the wool and remain effective for an extended period.

Treatment of Fly-blown Sheep.

During the fly season, frequent inspections of the flock should be made so that cases may be detected before serious harm is done. When any sheep are noticed to be struck they should be treated at once. Many various dressings have been applied with varying success. In our experience, a solution of lysol, one tablespoonful to a quart of water, has been found effective as a preliminary dressing. When applying a dressing, always surround the "struck" area by treating the outside margin first so as to prevent the maggots from escaping into the clean area, and then treat the whole area so that all maggots may be destroyed. The wool over the "struck" area should then be removed with the shears, care being taken to have a margin extending into the clean wool. After treatment, affected sheep may be drafted

off and placed in a small paddock where they can be kept under close observation. As a rule, one dressing will be found effective, but if the animal be badly "struck," it should be yarded each day and dressed until recovery is complete.

When maggots have penetrated the flesh through wounds, it is more difficult to get rid of them unless the wound be an open one. In that case the dressing can be poured into the wound, where it will come into direct contact with the maggots. With a punctured wound, the best plan is to force some of the dressing through a syringe to the bottom of the wound, and thus prevent the maggots from burrowing deeper with pus which may be formed. This treatment also answers for wounds that underrun the skin, but if that appear extensive, the skin should be slit so that the full extent of the damage may be seen, and the maggots reached easily. Any scabs that have maggots under them should be removed, and the wound will quickly heal again when freed from the maggots.

A dressing to be successful must be sufficiently strong to kill all the maggots, but must not be injurious to the sheep or wool. It should be mild and healing, so that the wounds will quickly recover. It must also be obnoxious to the flies so that they will not restrike the part, and therefore it must be retained on the wool and skin so that a temporary immunity may be obtained.

The most successful dressing is made up as follows:—

Creosote, 6 parts.
Turpentine, 20 parts.
Olive oil or raw linseed oil, 40 parts.

This may be applied with a swab after dislodging the maggots and cleaning up the affected area with the solution of lysol 1 tablespoonful to a quart of water, as mentioned above.

Precautions to Take.

By careful selection of the breeding sheep a great deal can be done to minimize the risk of fly strike. When drafting the ewes cull out all those showing excessive wrinkles, especially on the hind quarters, also those with a very narrow breech. By breeding only from the selected ewes with rams showing the same characteristics, a flock can be built up that will not be nearly so susceptible to blowfly attacks. Moreover, treatment will be greatly facilitated owing to the wider and flatter surface to be crutched.

All wrinkly ewes and those of bad conformation should be kept in convenient paddocks, so that they can be inspected frequently, and if a small temporary catching yard is constructed in each paddock the sheep can be handled and examined without excessive droving. By having the flock divided up into separate paddocks they may be inspected more thoroughly, and there is less likelihood of a badly-struck sheep being missed.

The rams should be carefully counted when inspecting, as one that has had his horns invaded by maggots will leave the flock, and will

not mate with the ewes. Dehorning of flock rams, when lambs, might profitably be carried out in districts where the flies are numerous.

When the flies are troublesome, do not keep the sheep yarded longer than necessary, as the flies are generally found in the greatest numbers round sheep yards.

CHEMISTRY IN AGRICULTURE.

INSECTICIDES AND FUNGICIDES.

W. R. Jewell, M.Sc., Agricultural Research Chemist.

In continuation of a somewhat scattered series of short articles* on the part played by chemistry in agriculture, I propose to deal now, in a very general way, with the part played by the chemist in developing insecticides and fungicides for the control of insects and fungi injurious to crops, basing most of my remarks on an article by Patten in "Chemistry in Agriculture." In the very early history of the human race, food production was relatively unimportant. With increase in population and the resulting increase in food production there was a proportionate increase in the number of insects and fungus diseases that attack and destroy vegetation. At first, losses due to these causes were considered a form of divine punishment, but as the losses increased to the point where they became an important economic factor in crop production, efforts were made to minimize them as much as possible. It is difficult to determine when measures for the control of insect pests and fungus diseases were first used, but early investigators apparently preferred materials that were offensive to the senses. In the early use of insecticides little thought was given to the characteristics or habits of the insects themselves, but when it was found that certain materials were fatal to some insects and of no avail against others, the insects themselves were studied.

It was found that they could be divided roughly into two classes, according to their feeding habits. One class is composed of insects that eat the foliage, and are called "chewing insects": the other punctures the leaf or fruit in order to suck the juice; the members of this class are known as "sucking insects." When this distinction in feeding habits became known it was plainly evident that different methods of control would have to be used. This difference has led to a classification of insecticides into poison sprays or stomach poisons, including those materials which act as true poisons when taken into the system, and contact sprays embracing those materials which kill upon contact with the body. Practically all effective insecticides and fungicides are true chemical compounds, or contain some active principal that is a chemical compound so that the control of insects and fungi is therefore, primarily, a case of chemical warfare against these pests.

* For previous articles see this *Journal* for July, August and November, 1928.

Poison Sprays.

Arsenic in one form or another has been, and still is, the chief ingredient in most poison sprays. It is obtained principally from certain smelting works, and while once a curse to these works, has now become a very important by-product, due to the rapid increase of its use in arsenical sprays. Paris green and London purple were, perhaps, the first arsenical compounds used as sprays, but neither possesses the qualifications of a universal insecticide, either because of the danger of injury to foliage, or because of variable composition. A substance of wider application was needed, and a chemist, Moulton, first advocated the use of lead arsenate, which is now so widely adopted. At first very little attention was paid to its chemical composition other than its total and soluble arsenic contents. As its use increased, chemists began to study its complete chemical composition and methods of manufacture. Two methods of manufacture were originally used. In both cases insoluble lead arsenate is produced, but when used as sprays it was found that the two products had somewhat different insecticidal qualities. Chemical analysis showed that one of these lead arsenates was a basic lead arsenate, whereas the other was an acid lead arsenate. The latter is practically as insoluble as the former, but is a quicker acting poison, contains more arsenic, is lighter and remains in suspension longer, although it is more liable to produce foliage injury under certain conditions. Fineness and slow sedimentation are two qualities that an insecticide should possess in order that it may be distributed completely and evenly upon the foliage. Adhesiveness is another important quality, for the longer a material will remain on the foliage the longer will it be effective as an insecticide.

Chemists have been studying these problems with the result that the lead arsenate of to-day is far superior to that of ten years ago, and is now marketed as a powder as well as a paste. Calcium arsenate, a compound of lime and arsenic has been developed as a cheaper form of arsenate.

Contact Insecticides.

Pyrethrum was one of the first substances successfully used as a contact insecticide. It is composed of the powdered flower-heads of pyrethrum plants of the chrysanthemum genus. Its insecticidal value is due to two toxic compounds called Pyrethrin I. and Pyrethrin II. present in the insect powder to the extent of .2 to .3 per cent. Most of the insect powders and fly killers sold at the present time for household use are either powdered or extracted pyrethrum, although they may parade under a variety of names.

The value of soap solutions for the control of various soft-bodied sucking insects has long been recognized, and these are frequently added to other sprays to increase the spreading property by lowering the surface tension of the mixture.

Under oil emulsions are included kerosene, crude petroleum, oil distillates, and the so-called miscible oils and creosote oil emulsions which have long been recognized as possessing insecticidal value. While highly efficient, unmixed oils alone are decidedly harmful to vegetation and it was necessary to evolve a method of application that would remove or minimize this danger. This was successfully accomplished by adding to the oil certain chemicals that act as emulsifiers so that,

when mixed with water, a stable emulsion is obtained. An emulsion is simply a fine state of division of the oil in the water, brought about by the emulsifier, often a soap, forming a very thin film around the droplets of oil and preventing their coalescing. Calcium caseinate and saponin are two substances that have recently been employed in emulsifying agents. It has been found that that proportion of an oil that may be sulphonated with sulphuric acid has a deleterious effect on foliage, and a recent development is the use of white refined paraffin oils, in which this harmful fraction has been eliminated.

Nicotine, extracted from tobacco, has long been known as an insecticide. Since it is volatile, nicotine extracts cannot be concentrated by boiling unless some means are taken to fix the nicotine in a stable form. Sulphuric acid is used for this purpose, and nicotine sulphate is well known. Solutions of both free nicotine and nicotine sulphate that contain 40 per cent. of the alkaloid are on the market. Nicotine dusts are also used in which the nicotine preparations are mixed with some finely divided carrier, such as kaolin, hydrated lime, &c.

Lime sulphur is one of the most widely used contact insecticides for scale insects. It is prepared by boiling together a mixture of sulphur, hydrated lime, and water whereby soluble polysulphides of lime are formed.

Fumigants.

Fumigation is an important means of insect control under certain conditions. The fumigation of citrus trees with hydrocyanic acid for scale insects is well known. This is carried out either with liquid hydrocyanic acid or with calcium cyanide in the form of a powder which liberates hydrocyanic acid gas on exposure to the atmosphere. Stored grain and many food products are fumigated with carbon disulphide in a closed chamber. A carbon tetrachloride-ethyl acetate mixture is sometimes used in place of carbon disulphide for this purpose.

Fungicides.

The losses by fungus diseases are probably as great as those caused by insects. The destruction caused by fungi is more insidious than that caused by insects because they cannot be detected by the naked eye; their presence is not suspected until their depredations become evident. Under suitable conditions a fungus disease may spread very rapidly and the damage be complete before control measures can be undertaken. The control of fungi is therefore a matter of prevention rather than of cure after the disease is apparent.

The fungicidal property of copper was discovered in France as far back as 1807 when a solution of copper sulphate was advocated for the control of bunt in wheat. In 1882, in a French vineyard, it was noticed that some vines retained their leaves, while elsewhere they had entirely fallen. The explanation was in the fact that the vines near the roadway had been covered with a mixture of copper sulphate and lime to keep away thieves who were afraid to eat the fruit for fear it also was contaminated with this mixture. A series of experiments followed on the use of copper sulphate—lime mixtures in the control of fungus diseases—with the result that the now well-known Bordeaux mixture was evolved, prepared by mixing a solution of copper sulphate and milk of lime, thereby precipitating a basic copper sulphate. As prevention is better than cure, the treatment of wheat for killing bunt spores by the use of copper carbonate dust is well established.

Dusts.

The application of liquid sprays is, under some conditions, attended with considerable difficulty and much labour. Orchardists have long desired some way of reducing the labour of spraying without reducing the efficiency of their efforts. The use of insecticides and fungicides in the form of very fine dusts offers a solution of the problem that is receiving much attention at the present time, and is becoming increasingly popular. The materials used as dusts are chiefly lead arsenate, sulphur, calcium arsenate, copper salts, and nicotine products, diluted with such substances as lime, kaolin and gypsum, all in a very fine state of subdivision. The advantage of dusting as against spraying is chiefly a saving in time combined with the fact that dusting may be carried out on occasions when spraying would not be feasible.

Conclusion.

Chemists the world over in conjunction with entomologists and plant pathologists are constantly striving to improve and invent new destructive agents for pests, and to find more efficient methods of applying them by means of spreaders and stickers and other means. Much remains to be accomplished before the war against destructive insects and fungi is won.

ROPINESS IN CREAM.

By R. T. McKenzie, Senior Dairy Supervisor.

Ropy or stringy cream is not uncommon on northern irrigation dairy farms. As such cream is always graded at the butter factory, it means a pecuniary loss to the owner concerned. Ropiness is caused by an organism that enters the milk from extraneous sources. Infection may come from the water in which utensils are washed, the germs remaining on the walls of the milk vessel. There is little doubt this is the common cause of the trouble in the north, for there the water used is generally drawn from irrigation channels which are liable to become contaminated with slime-producing organisms. Unless the water be sterilized these micro-organisms will not be destroyed.

If the water be suspected, it may be tested by placing some milk known to be free from ropiness, or else some boiled milk, in a glass that has been sterilized. To the milk some of the water should be added and the mixture kept in a warm clean place. If the water be contaminated in the way supposed, the milk in the glass will become ropy.

Infection may also be caused by the bacteria lodging on the flanks and udders of cows when the animals are wading in marshes or in stagnant water. There is a considerable number of such places in the

irrigation areas formed by water seepage, and by the super-saturation that sometimes occurs during watering. Several instances have come under the notice of the writer, where the trouble was prevalent until the cows were kept from certain wet places.

As a further precaution the udders and flanks should be washed in a disinfecting solution similar to that used on the utensils.

In some cases the slime-producing organism may be present in the milk before it is drawn from the cow. Milk from individual cows can be tested by placing a small quantity in a sterilized bottle and allowing it to stand for some hours in a clean warm place, when it may be examined for ropiness.

It is obvious that where the cause is the washing-up-water, prevention lies in its thorough sterilization. There are several ways in which water may be sterilized, the two commonest being chlorination and ebullition or boiling. Chlorination is a method of introducing chlorine gas in some form into water, and it is said to destroy 100 per cent. of living organisms. In dairy practice chlorine is used in the form of sodium hypochlorite. Two to four parts per million are needed (according to infection) to sterilize water. Ordinary water requires 1 part sodium hypochlorite to 300,000 parts water. Sodium hyprochlorite costs approximately 6s. per gallon, and a gallon will sterilize 300,000 gallons of water; 15 cubic centimetres will sterilize 1,000 gallons, and as a c.c. is about 16 drops, it is apparent that only a very small quantity would be needed to sterilize sufficient water for a day's washing up.

Although the sterilization of water by boiling is a task that takes considerable time—time that may be wasted if re-contamination occurs during cooling—for all practical purposes it is effective. A case has come under notice where ropiness continued, although great care was being taken in sterilizing machines and utensils. It was learned that at this farm it was the practice to draw cold water through the machines prior to milking, and the Dairy Supervisor for the district (Mr. Hill), thinking that perhaps the machines were re-contaminated in this way, advised the owner to use cold boiled water. When this was done the trouble disappeared.

It should be needless to add that all milking utensils must be thoroughly sterilized. Merely washing and rinsing in hot water will not sterilize a milk vessel, especially if several be washed in the same water, bacteria are left on the walls of the vessel, and under favorable conditions, the increase in number is almost beyond belief. The water must be boiling, and the utensils soaked at this high temperature for some minutes. Too many dairymen depend for washing up on a kerosene bucket of water heated on the kitchen stove. This quantity is insufficient, and, further, by the time it reaches the dairy it has dropped several degrees in temperature. Where steam is not available, an ordinary 12-gallon washing-copper adjacent to the wash-up room will be found advantageous. Only sound seamless utensils should be used. It is almost impossible to sterilize those with seams as well as those that are badly dented.

To guard against ropiness, the cow-shed and dairy premises should not be overlooked. A thorough limewash will help to destroy any bacteria about the walls, crevices, &c.

POTATO MANURIAL TRIALS, 1928-29.

RESULTS AT MUSK.

Conducted on the Farm of Mr. E. Bull.

By J. T. Ramsay, Potato Expert.

Notwithstanding an adverse spell of dry weather during the early portion of the season, there is every evidence from the figures obtained from the potato experimental fields for the past season, that manuring is a sound and profitable investment, even in dry weather.

This is the third season during which these trials have been conducted at Musk, and over that period very informative results have been obtained. The finding of the seasons' trials of 1926-27 and 1927-28 gave substantial evidence that this class of country did not require heavy dressings of superphosphate; in fact, they showed that such applications were not only less profitable, but actually had a depressing effect on the yield when compared with moderate dressings. The soil is a volcanic brown loam of good texture and quality, which on analysis shows abundant content of all the essentials of fertility, yet in spite of this apparent abundance, certain manurial applications have the effect of so stimulating crop growth that their use is highly advantageous and profitable.

On account of the evidence obtained during the trials of the two previous seasons, an alteration was made in the rates of application of superphosphate for last year. Instead of a variation of 3, 6, and 9 cwt. of super. being given the amounts on the super. plots were reduced to 2, 3, and 4 cwt. respectively. This latter range evidently embraces the optimum quantity of super. for this soil, under present conditions. Previously it was found that the 3 cwt. dressing was giving nearly as good returns as the heavier applications which, of course, indicated that it was waste of money to invest in these. The past season's figures substantiate their findings fairly well.

Though evidently containing nitrogen much in excess of the potato crop's requirements, considerable response is shown to the application of ammonium sulphate at the rate of 1 cwt. to the acre in conjunction with 3 cwt. superphosphate, as indicated by the figures given for plot No. 4, where no less an increase than 96 per cent. was given by the dressing. Plot No. 6, with the addition of 3 cwt. super. over No. 4, actually gave a lesser yield, viz., 91 per cent. increase. The figures make interesting reading, and are presented in such a way as to show the increase given by manures in various forms, viz., in weight per acre cost of manure, cost of increase per ton, value in cash of increases after paying for manure, and the increases expressed in percentages. These varying forms of presenting the results are utilized so that the results may be as informative and as easy of assimilation as possible to growers.

It will, of course, be necessary for this new variation in manurial treatment for this class of country to be tried out further for some years before it can be dogmatically stated that the absolute best form

and rate of manure have been arrived at, and indeed further variations and extended trials of such variations may be necessary; but so far as the trials have gone they have done much to throw light on the manurial problems pertinent to this class of volcanic loam which were hitherto very obscure. In calculating the cash values of the crops resulting from the different treatments, £12 per ton has been taken for the year. This figure, though below the true average for the season, is sufficiently high to throw into relief the material benefit in cash return from manure investments. The outstanding figure from this aspect is No. 4 application, consisting of 3 cwt. super. and 1 cwt. ammonium sulphate per acre, which shows the considerable increase of 96 per cent. in weight of crop, and £18 odd net cash increase per acre. A considerable reduction in yield of these crops was caused by the attack of green aphis, but as all plots were equally affected in this way this damage had no bearing on the relative performances of the manurial variations.

The results of the trials are given herewith.

Results of Manure Trials on Potatoes at Musk, near Daylesford, 1928-29.

(On the farm of Mr. E. Bull. Soil—light-brown loam.)

Plot.	Manure per acre.	Market size. Tubers.	Increase due to manure.	Cost of manure.	Cost per ton. Increase.	Increased value per acre.	Net increased value per acre.	Per cent. increase.
		T. C. Q.	T. C. Q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
1	2 cwt. Super. ..	2 16 1	1 1 2	0 12 6	0 11 9	12 18 0	12 5 6	60%
2	3 cwt. Super. ..	2 17 2	1 2 3	0 18 9	0 16 6	13 13 0	12 14 3	66%
3	4 cwt. Super. ..	3 4 1	1 9 2	1 5 0	0 17 0	17 14 0	16 9 0	86%
4	3 cwt. Super. 1 cwt. Amm. Sulp.	3 8 1	1 13 · 2	1 15 6	1 1 2	20 2 0	18 6 6	96%
5	None	1 14 3	..	..	..	..	..	..
6	6 cwt. Super 1 cwt. Amm. Sulp.	3 6 3	1 12 0	2 14 3	1 14 4	19 4 0	16 9 9	91%
7	6 cwt. Super 1 cwt. Amm. Super 1 cwt. Pot. Sulp.	3 6 3	1 12 0	3 9 9	2 3 9	19 4 0	15 15 3	91%
8	3 cwt. Market garden	3 4 1	1 9 2	1 8 6	0 19 0	17 14 0	16 5 6	86%
9	3 cwt. Basic Phos...	2 10 3	0 16 0	0 19 6	1 4 0	9 12 0	8 12 6	45%

Manures valued at £1 per ton over Melbourne prices to allow for freight cartage and application.
Crop valued at £12 per ton.
Cost per ton increase to nearest fraction; also percentages.

(Results of Trials conducted at Experimental Plots in various parts of the State will be printed in later issues of this *Journal*.)

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

Spraying.

The peach aphis will now have made its appearance in orchards which were not sprayed with the red oil emulsion in the winter. The tobacco solution will now be required, and this may be sprayed on as strongly as the grower wishes. If possible, a second spraying should be repeated quickly after the first operation, so as to kill any aphides previously protected by the others, or any that may have only been weakened by the first operation.

The time has also arrived when spraying is needful for the prevention of all fungus diseases, such as shothole or scab, black spot, leaf rust, leaf curl, &c. In the case of these pests, "prevention better than cure" is the invariable rule; and to delay beyond the correct period the application of the necessary sprays is to court disaster. For black spot of the apple and pear, the spraying should be performed as soon as the earliest flowers are opening. For shothole and scab the time to spray is before the flower petals expand; and the spraying may be repeated, if necessary, after the fruit has set.

For rust and leaf curl the spray should be applied before any sign of the trouble appears on the foliage; thus, if the fungus were present during the previous season, it will be necessary to spray early to combat it successfully.

The basis of all the successful fungicides is sulphate of copper or bluestone. Bordeaux mixture (a mixture of bluestone, lime, and water, known as the 6.4.40 formula), is used; the materials and quantities being 6 lb. bluestone, 4 lb. lime, and 40 gallons water.

Another spray, and in some locations equally successful in its results as the Bordeaux mixture, is the copper-soda spray, the proportions being 6 lb. bluestone, 8 lb. washing soda, and 40 gallons of water. In each case the materials should be separately dissolved, and then evenly and simultaneously mixed in a third vessel.

It is very urgent that the lime should be thoroughly fresh and quick, otherwise the spray mixtures will give very inferior results A second necessary point is that the copper sprays should be used as soon as they are made. Where the grower does not wish to make his own spray, there are quite a number of ready-made Bordeaux pastes and Bordeaux mixtures already on the market, which can be used with satisfactory results. In fact, the use of these has become fairly general, and it is not now the practice for growers to make their own sprays.

General.

It is most important that ploughing should be completed as early as possible. In the past, it has very frequently happened that, owing to delaying the ploughing, the orchard and the fruit crop have both suffered very considerably. It is absolutely necessary to cultivate the surface early, to take advantage of the moist surface and consequent

easy ploughing; and also to conserve as large an amount of moisture in the soil as possible. The longer the ploughing is delayed, the less amount of moisture is retained in the soil for summer use. Deferred ploughing certainly means dry soil, enfeebled trees, and diminished results. Early ploughing gives exactly opposite results; the earlier the ploughing, the more soil water is conserved.

When the ploughing is completed, the clods should be crushed, and the land harrowed, so that a fine earth mulch may be obtained. The orchard surface should be kept as level as possible, and no irregular ridging or furrows should be allowed.

All cover crops planted to supply humus to the soil should now be ploughed in. If the plants are of a leguminous nature, the best time to plough these in is when they are in full flower. If the growth has been at all excessive or rank, the crop may be rolled before ploughing; or it may be cut or mowed with a mowing machine. Every care should be taken that the plants should be distributed evenly over the ground, and large quantities in a mass should not be ploughed under. Artificial and stable manures may also be given to the trees at this time. These should be applied before ploughing.

Grafting.

The work of grafting should be completed early in the month. The most useful method of re-working old trees is to cut the head right off, leaving only the stump. Then grafts can be put in according to the fancy of the grower. The old method of cleft grafting has been superseded by the bark or crown graft. The latter method does not cause any damage to the wood and thus, with care, no rotting can take place. The best method of bark grafting is the saddle graft; that is, the graft is inserted in the bark and a strip of bark is carried right across the trunk and inserted in the bark on the opposite side. This method is much slower than the ordinary bark graft, but it insures a much quicker healing over the old stump.

The Vegetable Garden.

The vegetable plots should be cleaned from all weeds, having the light weeds dug in and the stronger ones pulled out and rotted in the compost heap. The surface should be worked up to a very fine tilth after digging; it must be kept constantly loose with the hoe to keep the soil cool; and prior to digging it will be advantageous to give a top dressing of lime.

If the weather be dry or windy, all newly-planted plants should be frequently watered. In transplanting seedlings, it is a help to dip the whole plant in water before planting.

Any seedlings that are ready may be planted out; the first crop of tomato plants may be planted out under shelter until the frosts are over. At the end of the month a sowing of French bean seeds may be made. Seeds of peas, broad beans, and beet, cabbage, kohl-rabi, and radish, turnip, cauliflower, lettuce, carrot, parsnip, &c., may be sown in the open. Seeds of melons, cucumbers, pumpkins, marrows, and similar plants may be planted in frames for transplanting after the frosts have gone.

The Flower Garden.

After digging the surface must be kept constantly stirred with the hoe, so as to have it loose and friable for cooling and for moisture-conserving purposes. All weeds must be kept down, as they are robbers of plant food and moisture at this season of the year. Shrubs of all kinds may still be planted out, and these should be well watered after planting. Rose and other aphides must be watched for, and sprayed when they appear with a nicotine spray. Rose scale should be sprayed with lime sulphur wash or with kerosene emulsion This pest will soon disappear if the bushes are kept open to admit air and the sunlight freely. Rose mildew will now be appearing, and the plants, as well as the soil, should be sprinkled with liberal dustings of sulphur. Sulphide of potassium is also a good specific for this fungus trouble, using it at the rate of 1 oz. to 3 gallons of water.

Cannas, early chrysanthemums, and early dahlia tubers may be planted out, as well as all kinds of herbaceous plants, such as delphiniums, perennial phlox, asters, &c. These clumps should be well broken up, and in planting they should be fed with a liberal quantity of stable manure or bonedust, using 6 ounces per square yard. Beds should be prepared and well dug over for exhibition chrysanthemums and dahlias.

REMINDERS FOR OCTOBER.

LIVE STOCK.

Horses.—Continue to feed stabled horses well, add a ration of green-stuff. Rug at night. Continue hay or straw, chaffed or whole, to grass-fed horses. Feed old or badly-conditioned horses liberally. If too fat, mares due to foal shortly should be put on poorer pasture. Mares with foals at foot should receive a good ration of oats daily. Those intended for breeding, if not already stinted, should be put to the horse. Colts not intended to be kept as stallions should be gelded. Working horses due for a spell should be turned out to grass.

Cattle.—The call for rugs is now over. Herbage, being now at the flush, be prepared for milk fever, and have the air-pump handy. (Leaflet on milk-fever treatment is obtainable from the Department of Agriculture.) The abundance of green feed makes calf-rearing now easy, and, further supplement to skim milk entirely unnecessary for calves over three weeks old. On cream-selling farms the necessity for having either pigs or calves is now at its greatest, but the former may be easily overpaid for at this time. If one buys with the crowd, one must expect to sell with the crowd, which usually means dear purchases and low-selling prices. One is fortunate at this time to have a class of heifer calf that makes its rearing worth while, and young home-grown pigs that have cost 10s. a piece to rear instead of, perhaps, 30s. to purchase. The time for sowing summer crops is approaching, and the land, for Japanese millet, Sudan grass (for less moist situations), and maize (best conserved as ensilage), should be clean and ready for seeding at the month end. Owing to the softness of the feed and consequent dirty switches, great care is now necessary to protect the milk from manure contamination. Tails should be hitched to a nail when milking, and abundant water used in washing udders. Preparation should now be made for harvesting the fodders being grown for conservation (hay as ensilage).

PIGS.—Supply plenty of bedding in warm, well-ventilated styes. Keep styes clean and dry, and feeding troughs clean and wholesome. Sows suckling young should be well fed to enable them to produce plenty of milk; about 2 lb. grain mixture for the sow, and 1 lb. for each young one being suckled. Watch sows carefully for signs of constipation; the addition of a little bran to the grain mixture is a good preventive. Give young pigs grain mixture and skim milk in separate trough as soon as they will take it, and keep them fattening from the start to get them off as early as possible. Pig breeding and feeding should be very profitable for a long time to come, and it should be safe to launch out now.

SHEEP.—Shear as early as the weather will permit, and avoid the usual excessive dust in travelling to, and yarding at sheds. Burr and seeds also collect on the fleeces if shearing be left until late in the season, particularly with lambs. Shear all lambs intended to be held over—they thrive better and make more growth through the ensuing summer and autumn.

Brand bales neatly, and on the flat side do not use sheep-branding oil, tar, or paint. Stencil plates and branding ink can be obtained on application to the respective brokers.

Before shearing commences everything should be clean and all gear in good working order.

As soon as the belly wool is off, pick it up; if from a wether, remove the stain. Always keep urine stain separate, as it is a permanent stain in wool and will not scour out under ordinary conditions.

When the shearer lets go the fleece it should be picked up by taking hold of the two hind legs, which should be lifted up, then doubled back and drawn round the rest of the fleece. The fleece should then be carried to the table and thrown out, the neck being allowed to go forward.

The method of skirting wool to be followed will depend upon the number of sheep husbanded. The more sheep run, the more one can afford to skirt under ordinary conditions.

If a fleece be carrying burr to the extent of about 3 or 4 inches deep all round, it should be skirted to that depth, so as to make the portion left on the table free. If the fleece be very burry, all that the farmer can do is to remove the dirty, fribby edges.

In rolling a fleece of wool, turn back the neck and britch ends one-third of the way; divide the fleece in half, and in half again, and roll the britch to the neck. In this way the shoulder and rib wool will be exposed, and make the fleece look as attractive as possible.

POULTRY.—The bulk of incubation should cease this month—late chickens are not profitable. Devote attention to the chickens already hatched; avoid overcrowding. Feed with dry mash. Also add plenty of green food to ration.

A mixture made from the ingredients specified below has given very satisfactory results in rearing chickens:—

80 lb. maize meal.
40 lb. ground wheat.
20 lb. ground hulled oats.
20 lb. bran.
6 lb. charcoal.
5 lb. bone-meal.
20 lb. dried buttermilk.
5 lb. fine shell grit.
1 lb. salt.
1 lb. superphosphate.

This mixture can be given either as a dry or a wet mash. The usual custom is to have a dry mash always available, and to feed a wet mash a couple of times during the day. It can be fed from the first feed when the chicks are two days old until they reach maturity. For a scratch grain, 40 lb. cracked wheat, 80 lb. cracked maize, and 20 lb. cracked hulled oats make a very good mixture.

Feed ground grain, such as wheat, hulled oats, and maize, which should be fed in hopper to avoid waste. Grit or coarse sand should be available at all times. Variety of food is important in growing chicks; insect life aids growth. Remove brooders to new ground as often as possible; tainted ground will retard development.

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Sow 10 lbs. per acre in drills; 20 lbs. broadcast. **3d.** lb.; **22/6** cwt.; **£21** ton in ¼-ton lots or more.

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Sow 14 lbs. per acre broadcast, or 7 lbs. in drills; **6d.** lb.; **40/-** cwt.

Early Ambercane

Sow 7 lbs. per acre in drills; 14 lbs. broadcast. **6d.** lb.; **40/-** cwt.

LUCERNE

(Sow 8 to 10 lbs. per acre in drills, or 20 lbs. broadcast)

HUNTER RIVER ("Pilca-Butta" Strain), 2/9 lb.; **2/8** lb. in 28-lb. lots or more. **2/7** lb. in ½-cwt. lots or more; **Ordinary Machine-cleaned** (guaranteed broad leaf N.S.W. grown), **2/7** lb.; **2/6** lb. in ¼-cwt. lots or more.

FRENCH PROVENCE (True), 2/3 lb.

NEW ZEALAND (Celebrated Marlborough Strain), 2/3 lb.; **2/1** lb. in ½-cwt. lots or more.

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Sheep's Parsley—2/6 lb.

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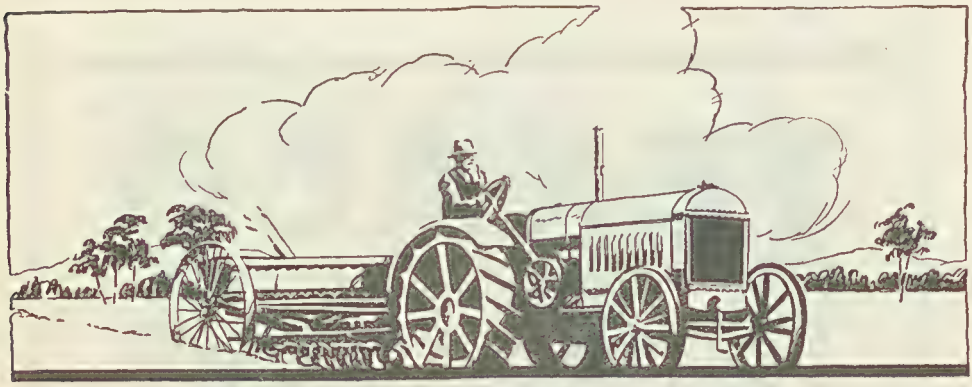

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Orders for Cockerels for delivery from March may now be booked from the Poultry Pens at the Central Research Farm, Werribee
Settings of Eggs can be supplied in season
1st July to 1st October orders are booked in rotation

WHITE LEGHORNS

No. 1—Pure Cosh World's Record Strain.
„ 2—From Single Tested Hens with scores of 260 to 285 eggs, Single Mated to Cocks bred from Hens with scores of 275 to 301 eggs.

UTILITY BLACK ORPINGTONS

(Founded on Christie and Cullen Strains)

No. 1—From Single Tested Hens with scores of 256 to 284 mated to Cockerels bred from Hens with scores of 272 to 313 eggs.
„ 2—From Hens bred from above mated to Cockerels bred from Single Matings.

For prices and particulars apply to The Manager, Research Farm, Werribee

The Day of Division!

WHEN you divide your income on Pay-day—allowing some of it for this expense, and some for that—make provision *without fail* for a regular, weekly Bank Deposit.

Regular saving is the only successful way. Regular saving converts ORDINARY Men into PROSPEROUS Men.

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THE VICTORIA STUD
OF
FRIESIAN CATTLE

STATE RESEARCH FARM, WERRIBEE

10 BULLS (Yearlings)

FOR SALE

5 FEMALES

BULLS:

All eligible for registration in the Friesian Herd Book of Australia. All are progeny of cows tested in Standard Herd Test.

1. Born .. .. 22nd October, 1927
Sire, Dominion Oakdale.
Dam, Victoria Wedding Bell. **18 Guineas**

2. Born .. .. .. 14th June, 1923
Sire, Victoria Top Note.
Dam, Victoria Oakbell. **18 Guineas**

3. Born .. .. .. 16th July, 1928
Sire, Victoria Joyous Mercedes.
Dam, Victoria Coruscate. **20 Guineas**

4. Born .. .. 22nd December, 1928
Sire, Victoria Joyous Mercedes.
Dam, Victoria Carina. **21 Guineas**

5. Born .. .. .. 8th April, 1929
Sire, Dominion Oakdale.
Dam, Victoria Carraway **17 Guineas**

6. Born .. .. .. 4th May, 1929
Sire, Victoria Top Note.
Dam, Victoria Plebe. **26 Guineas**

7. Born .. .. .. 15th May, 1929
Sire, Victoria Tenor.
Dam, Victoria Skirt. **10 Guineas**

8. Born .. .. 23rd May, 1929
Sire, Victoria Tenor.
Dam, Victoria Wedding Oak. **10 Guineas**

9. Born .. .. .. 6th June, 1929
Sire, Victoria Joyous Mercedes.
Dam, Victoria Top Patch. **10 Guineas**

10. Born .. .. .. 23th July, 1929
Sire, Victoria Top Note.
Dam, Victoria Oakbell. **18 Guineas**

The prices quoted are based on butterfat production of dam at rate of 1s. per lb., except in the case of progeny of heifers without completed test, the price then being 10 guineas.

HEIFERS:

SIRED BY THE FOLLOWING STUD BULLS:

VICTORIA JOYOUS MERCEDES (985)—Reserve Champion Royal Show, Melbourne, 1928. *Sire*, Dominion Woodcrest Plebe Mercedes (714); *Dam*, Victoria Joybell (905). Records—Milk, 15,387 lbs; Test, 3·67; Butterfat, 565 lbs. in 273 days.

VICTORIA TOP NOTE (874)—*Sire*, Victoria Songboy (359); *Dam*, Dominion Hyacinth (374). Records—Milk, 13,532 lbs.; Test, 3·95; Butterfat, 536 lbs. in 273 days.

DOMINION OAKDALE (242) (Imp.)—*Sire*, Dominion Oak de Kol 2nd Homestead Forbes (341 N.Z.F.H.B.) *Dam*, Dominion Rance (706 N.Z.F.H.B.)

1. VICTORIA WEDDING BELL. Born 18th Jan., 1922
Sire, Victoria Milkman Jo
Dam, Dominion Belle Corona
In calf to Dominion Oakdale, due 13th Oct., 1929
Price - - 15 Guineas

2. VICTORIA OAKBELL - Born 13th Dec., 1924
Sire, Dominion Oakdale
Dam, Dominion Belle Corona
Not in calf
Price - - 30 Guineas

3. VICTORIA CLARABELLE - Born 28th Sept., 1926
Sire, Dominion Oakdale
Dam, Victoria Pattibelle
Not in calf
Price - - 15 Guineas

4. VICTORIA DOUBLE PATCH - Born 4th Oct., 1927
Sire, Victoria High Patch
Dam, Victoria Lean Patch
In calf to Victoria Joyous Mercedes, due 9th May, 1930
Price - - 15 Guineas

5. VICTORIA JOY PATCH - Born 7th Oct., 1928
Sire, Victoria Joyous Mercedes
Dam, Victoria Lean Patch
Not in calf.
Price - - 10 Guineas

Inspection cordially invited. For further particulars apply to—

Dr. S. S. Cameron, Director of Agriculture, Melbourne, C.2; or The Manager, State Research Farm, Werribee

Clydesdale Colts

FOR SALE

STATE RESEARCH FARM, WERRIBEE,

VICTORIA

Selected from the 1927 drop of Colt Foals

All eligible for registration—Class A, A.C.S.B. Well-grown, active animals carrying Government certificate of soundness. Suitable for limited service this season.

VICTORIA SOLID STAMP

Dark bay, foaled 4th Sept., 1927

Well-grown, heavy, solidly-built colt. Will make a well-proportioned stallion.

Sire .. EBONY STAMP (2035 N.Z.S.B.)
G.Sire .. SPRINGFIELD STAMP (1079 N.Z.S.B.) by SCOTLAND SUCCESS
Dam .. BESSIE CHARTER (104 C.C.S.B.) by SCOTLAND'S VICEROY (imp.)
G.Dam .. BESSIE DEANS (105 C.C.S.B.) by ST. SIMON (433 C.C.S.B.)

Price - - 80 Guineas

VICTORIA BARON MIDGE

Bay, foaled 10th Oct., 1927

A very high-class colt

Sire .. BARON WIGTON (imp.) (13884 C.S.B.) (58 C.C.S.B.)
G.Sire .. BARONSON (10981 C.S.B.) by BARON'S PRIDE
Dam .. WIDGIEWA ROSALIE (2255 C.C.S.B.) by CRAIGIE MASTERSTROKE (imp.) (19072 C.S.B.)
G.Dam .. WIDGIEWA ROSALIND (980 C.C.S.B.) by FEDERATION (imp.) (11034 C.S.B.)

Price - - 80 Guineas

VICTORIA BARON LEURA

Bay, foaled, 13th Sept., 1927

A very well-grown colt, and will make a very big high class horse.

Sire .. BARON WIGTON (imp.) (13884 C.S.B.) (58 C.C.S.B.)
G.Sire .. BARONSON (10981 C.S.B.) by BARON'S PRIDE
Dam .. LEURA (1367 C.C.S.A.) by BARON WATSON (56 C.C.S.B.)
G.Dam .. GIP 6TH by STAR'S PRIDE

Price - - 80 Guineas

For further particulars, apply

THE MANAGER, STATE RESEARCH FARM

WERRIBEE, VICTORIA

630.5
V64S